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<u>Docket #:</u>	<u>Application #</u>	<u>Application Date</u>	<u>Patent #:</u>	<u>Grant Date</u>
B-113D1	12/165,301	06/30/08	7,670,568	03/02/10

System For Reactivating Catalysts

A method of reactivating a catalyst, such as a solid catalyst or a liquid catalyst is provided. The method comprises providing a catalyst that is at least partially deactivated by fouling agents. The catalyst is contacted with a fluid reactivating agent that is at or above a critical point of the fluid reactivating agent and is of sufficient density to dissolve impurities. The fluid reactivating agent reacts with at least one fouling agent, releasing the at least one fouling agent from the catalyst. The at least one fouling agent becomes dissolved in the fluid reactivating agent and is subsequently separated or removed from the fluid reactivating agent so that the fluid reactivating agent may be reused. A system for reactivating a catalyst is also disclosed.

B-118	10/059,669	01/29/02	6,896,854	05/24/05
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Nonthermal Plasma Systems And Methods For Natural Gas And Heavy Hydrocarbon Co-conversion

A reactor for reactive co-conversion of heavy hydrocarbons and hydrocarbon gases and includes a dielectric barrier discharge plasma cell having a pair of electrodes separated by a dielectric material and passageway therebetween. An inlet is provided for feeding heavy hydrocarbons and other reactive materials to the passageway of the discharge plasma cell, and an outlet is provided for discharging reaction products from the reactor. A packed bed catalyst may optionally be used in the reactor to increase efficiency of conversion. The reactor can be modified to allow use of a variety of light sources for providing ultraviolet light within the discharge plasma cell. Methods for upgrading heavy hydrocarbons are also disclosed.

B-153	10/655,467	09/03/03	7643703	01/05/10
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Image Change Detection Systems, Methods, And Articles Of Manufacture

Aspects of the invention relate to image change detection systems, methods, and articles of manufacture. According to one aspect, a method of identifying differences between a plurality of images is described. The method includes loading a source image and a target image into memory of a computer, constructing source and target edge images from the source and target images to enable processing of multiband images, displaying the source and target images on a display device of the computer, aligning the source and target edge images, switching displaying of the source image and the target image on the display device, to enable identification of differences between the source image and the target image.

B-338D1	11/772,868	07/03/07	7,772,361	08/10/10
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Polybenzimidazole Compounds

A PBI compound includes imidazole nitrogens at least a portion of which are substituted with an organic-inorganic hybrid moiety. At least 85% of the imidazole nitrogens may be substituted. The organic-inorganic hybrid moiety may be an organosilane moiety, for example, (R)Me₂SiCH₂-- where R is selected from among methyl, phenyl, vinyl, and allyl. The PBI compound may exhibit similar thermal properties in comparison to the unsubstituted PBI. The PBI compound may exhibit a solubility in an organic solvent greater than the solubility of the unsubstituted PBI. The PBI compound may be included in separatory media. A substituted PBI synthesis method may include providing a parent PBI in a less than 5 wt% solvent solution. Substituting may occur at about room temperature and/or at about atmospheric pressure. Substituting may use at least 5 equivalents in relation to the imidazole nitrogens to be substituted or, preferably, about 15.

B-338D2	11/772,872	07/03/07	7,632,898	12/15/09
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Polymeric Media Comprising Polybenzimidazoles N-substituted With Organic-inorganic Hybrid Moiety

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A PBI compound includes imidazole nitrogens at least a portion of which are substituted with an organic-inorganic hybrid moiety. At least 85% of the imidazole nitrogens may be substituted. The organic-inorganic hybrid moiety may be an organosilane moiety, for example, (R)Me₂SiCH₂-- where R is selected from among methyl, phenyl, vinyl, and allyl. The PBI compound may exhibit similar thermal properties in comparison to the unsubstituted PBI. The PBI compound may exhibit a solubility in an organic solvent greater than the solubility of the unsubstituted PBI. The PBI compound may be included in separatory media. A substituted PBI synthesis method may include providing a parent PBI in a less than 5 wt% solvent solution. Substituting may occur at about room temperature and/or at about atmospheric pressure. Substituting may use at least 5 equivalents in relation to the imidazole nitrogens to be substituted or, preferably, about 15.

B-385	10/846,195	05/13/04	7,074,256	07/11/06
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Phosphazene Membranes For Gas Separations

A polyphosphazene having a glass transition temperature ("T.sub.g") of approximately -20.degree. C. or less. The polyphosphazene has at least one pendant group attached to a backbone of the polyphosphazene, wherein the pendant group has no halogen atoms. In addition, no aromatic groups are attached to an oxygen atom that is bound to a phosphorus atom of the backbone. The polyphosphazene may have a T.sub.g ranging from approximately -100.degree. C. to approximately -20.degree. C. The polyphosphazene may be selected from the group consisting of poly[bis-3-phenyl-1-propoxy]phosphazene], poly[bis-(2-phenyl-1-ethoxy)phosphazene], poly[bis-(dodecanoxypolyethoxy)-phosphazene], and poly[bis-(2-(2-(2-omega.-undecylenyloxyethoxy)ethoxy)ethoxy)phosphazene]-. The polyphosphazene may be used in a separation membrane to selectively separate individual gases from a gas mixture, such as to separate polar gases from nonpolar gases in the gas mixture.

B-425	11/181,211	07/13/05	7,691,270	04/06/10
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Method For Removing Impurities From An Impurity-containing Fluid Stream

A method of removing at least one polar component from a fluid stream. The method comprises providing a fluid stream comprising at least one nonpolar component and at least one polar component. The fluid stream is contacted with a supercritical solvent to remove the at least one polar component. The at least one nonpolar component may be a fat or oil and the at least one polar component may be water, dirt, detergents, or mixtures thereof. The supercritical solvent may decrease solubility of the at least one polar component in the fluid stream. The supercritical solvent may function as a solvent or as a gas antisolvent. The supercritical solvent may dissolve the nonpolar components of the fluid stream, such as fats or oils, while the polar components may be substantially insoluble. Alternatively, the supercritical solvent may be used to increase the nonpolarity of the fluid stream.

B-460D3	12/893,192	09/29/10	8,551,607	10/08/13
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Methods Of Coating Core Materials For Production Of Armor Systems

An armor system and method involves providing a core material and a stream of atomized coating material that comprises a liquid fraction and a solid fraction. An initial layer is deposited on the core material by positioning the core material in the stream of atomized coating material wherein the solid fraction of the stream of atomized coating material is less than the liquid fraction of the stream of atomized coating material on a weight basis. An outer layer is then deposited on the initial layer by positioning the core material in the stream of atomized coating material wherein the solid fraction of the stream of atomized coating material is greater than the liquid fraction of the stream of atomized coating material on a weight basis.

B-480	11/123,607	05/06/05	7,514,575	04/07/09
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Production Of Biodiesel Using Expanded Gas Solvents

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A method of producing an alkyl ester. The method comprises providing an alcohol and a triglyceride or fatty acid. An expanding gas is dissolved into the alcohol to form a gas expanded solvent. The alcohol is reacted with the triglyceride or fatty acid in a single phase to produce the alkyl ester. The expanding gas may be a nonpolar expanding gas, such as carbon dioxide, methane, ethane, propane, butane, pentane, ethylene, propylene, butylene, pentene, isomers thereof, and mixtures thereof, which is dissolved into the alcohol. The gas expanded solvent may be maintained at a temperature below, at, or above a critical temperature of the expanding gas and at a pressure below, at, or above a critical pressure of the expanding gas.

B-481	10/969,456	10/19/04	7,309,758	12/18/07
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Polybenzimidazole Compounds, Polymeric Media, And Methods Of Post-polymerization Modifications

Several different N-substituent carboxyl polybenzimidazole derivatives were synthesized, and all of the modified polymers are much more soluble in organic solvents than the parent polybenzimidazole. Our modification pathway provides a straightforward post-polymerization synthetic modification that can be carried out at room temperature and gives nearly quantitative yields. We have obtained spectroscopic evidence and gas testing data from these new products. From the NMR analysis, almost all of the polybenzimidazole is substituted. Some of our modified polymers are good film formers that can be returned to the parent polymer after heating. The carbamate polybenzimidazole was slowly heated and all of the functional groups. Membrane gas testing showed values that are higher than the parent polymer. We report the synthesis and characterization of our polymer products to include a new series of N-substituent carboxyl polybenzimidazoles.

B-481D1	11/933,604	11/01/07	8,063,174	11/22/11
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Polybenzimidazole Compounds

Several different N-substituent carboxyl polybenzimidazole derivatives were synthesized, and all of the modified polymers are much more soluble in organic solvents than the parent polybenzimidazole. Our modification pathway provides a straightforward post-polymerization synthetic modification that can be carried out at room temperature and gives nearly quantitative yields. We have obtained spectroscopic evidence and gas testing data from these new products. From the NMR analysis, almost all of the polybenzimidazole is substituted. Some of our modified polymers are good film formers that can be returned to the parent polymer after heating. The carbamate polybenzimidazole was slowly heated and all of the functional groups. Membrane gas testing showed values that are higher than the parent polymer. We report the synthesis and characterization of our polymer products to include a new series of N-substituent carboxyl polybenzimidazoles.

B-481D2	11/933,652	11/01/07	8,129,498	03/06/12
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Polymeric Medium

Several different N-substituent carboxyl polybenzimidazole derivatives were synthesized, and all of the modified polymers are much more soluble in organic solvents than the parent polybenzimidazole. Our modification pathway provides a straightforward post-polymerization synthetic modification that can be carried out at room temperature and gives nearly quantitative yields. We have obtained spectroscopic evidence and gas testing data from these new products. From the NMR analysis, almost all of the polybenzimidazole is substituted. Some of our modified polymers are good film formers that can be returned to the parent polymer after heating. The carbamate polybenzimidazole was slowly heated and all of the functional groups. Membrane gas testing showed values that are higher than the parent polymer. We report the synthesis and characterization of our polymer products to include a new series of N-substituent carboxyl polybenzimidazoles.

B-482	10/986,742	11/11/04	7,592,282	09/22/09
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Enhancement Of Alkylation Catalysts For Improved Supercritical Fluid Regeneration

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<u>Docket #:</u>	<u>Application #</u>	<u>Application Date</u>	<u>Patent #:</u>	<u>Grant Date</u>
BA-013	11/535,084	09/26/06	7,514,695	04/07/09
<p>A method of modifying an alkylation catalyst to reduce the formation of condensed hydrocarbon species thereon. The method comprises providing an alkylation catalyst comprising a plurality of active sites. The plurality of active sites on the alkylation catalyst may include a plurality of weakly acidic active sites, intermediate acidity active sites, and strongly acidic active sites. A base is adsorbed to a portion of the plurality of active sites, such as the strongly acidic active sites, selectively poisoning the strongly acidic active sites. A method of modifying the alkylation catalyst by providing an alkylation catalyst comprising a pore size distribution that sterically constrains formation of the condensed hydrocarbon species on the alkylation catalyst or by synthesizing the alkylation catalyst to comprise a decreased number of strongly acidic active sites is also disclosed, as is a method of improving a regeneration efficiency of the alkylation catalyst.</p>				
<p>A Detector And Method For Inspecting A Sealed Nuclear Storage Container</p> <p>A detector and methodology for inspecting a sealed nuclear storage container is described and which includes a collimated gamma-ray radiation detector which is moveably borne by the sealed nuclear storage container, and which detects gamma-ray radiation which is emitted by a plurality of spent nuclear fuel sources which are enclosed within the sealed nuclear storage container for purposes of detecting the illicit or unauthorized removal of spent nuclear fuel from the nuclear storage container.</p>				
BA-032	11/210,577	08/23/05	7,807,606	10/05/10
<p>High Capacity Adsorption Media For Separating Or Removing Constituents, Associated Apparatus, And Methods Of Producing And Using The Adsorption Media</p> <p>ABSTRACT OF THE DISCLOSURE</p> <p>A method of producing an adsorption medium to remove at least one constituent from a feed stream. The method comprises dissolving and/or suspending at least one metal compound in a solvent to form a metal solution, dissolving polyacrylonitrile into the metal solution to form a PAN-metal solution, and depositing the PAN-metal solution into a quenching bath to produce the adsorption medium. The at least one constituent, such as arsenic, selenium, or antimony, is removed from the feed stream by passing the feed stream through the adsorption medium. An adsorption medium having an increased metal loading and increased capacity for arresting the at least one constituent to be removed is also disclosed. The adsorption medium includes a polyacrylonitrile matrix and at least one metal hydroxide incorporated into the polyacrylonitrile matrix.</p>				
BA-069	11/461,337	07/31/06	7,951,283	05/31/11
<p>High Temperature Electrolysis For Syngas Production</p> <p>Syngas components hydrogen and carbon monoxide may be formed by the decomposition of carbon dioxide and water or steam by a solid-oxide electrolysis cell to form carbon monoxide and hydrogen, a portion of which may be reacted with carbon dioxide to form carbon monoxide. One or more of the components for the process, such as steam, energy, or electricity, may be provided using a nuclear power source</p>				
BA-072D1	13/193,427	07/28/11	8,409,377	04/02/13
<p>Combustible Structural Composites And Methods Of Forming Combustible Structural Composites</p> <p>Combustible structural composites and methods of forming same are disclosed. In an embodiment, a combustible structural composite includes combustible material comprising a fuel metal and a metal oxide. The fuel metal is present in the combustible material at a weight ratio from 1:9 to 1:1 of the fuel metal to the metal oxide. The fuel metal and the metal oxide are capable of exothermically reacting upon application of energy at or above a threshold value to support self-sustaining combustion of the combustible material within the composite. Structural-reinforcing fibers are present in the composite at a weight ratio from 1:20 to 10:1 of the structural-reinforcing fibers to the combustible material. Other embodiments and aspects are disclosed.</p>				
BA-077	11/460,662	07/28/06	7,680,502	03/16/10
<p>Radio Frequency Detection Assembly And Method For Detecting Radio Frequencies</p>				

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A radio frequency detection assembly is described and which includes a radio frequency detector which detects a radio frequency emission produced by a radio frequency emitter from a given location which is remote relative to the radio frequency detector; a location assembly electrically coupled with the radio frequency detector and which is operable to estimate the location of the radio frequency emitter from the radio frequency emission which has been received; and a radio frequency transmitter electrically coupled with the radio frequency detector and the location assembly, and which transmits a radio frequency signal which reports the presence of the radio frequency emitter.

BA-1002P 62/926,820 10/28/19

Sensing Units Including A Radio-frequency Sensor, And Related Systems, Devices, And Methods

Systems, devices, and methods related to generating and/or transmitting sensor measurement data are described. According to some embodiments, a sensing unit may include a substrate and a first conductive pad positioned on a first surface of the substrate. The sensing unit may also include a second conductive pad positioned on a second surface of the substrate, the second surface opposite the first surface. Further, the sensing unit may include an inductive coil coupled between the first electrical pad and the second electrical pad. Also, the sensing unit may include a third conductive pad positioned on a third surface of the substrate and configured to couple to a sensor, the third surface adjacent each of the first surface and the second surface. Furthermore, the sensing unit may include a fourth conductive pad positioned on a fourth surface of the substrate and configured to couple to the sensor, the fourth surface adjacent each of the first surface and the second surface and opposite the third surface. The sensing unit may be configured to wirelessly transmit a radio-frequency (RF) signal.

BA-1003 16/430,478 06/04/19

Silica Nanofiber Materials, Articles Including Such Materials, And Related Methods

A silica nanofiber material includes a flexible mat comprising a plurality of silica nanofibers. An electrical device may include an electrical component and the silica nanofiber material disposed over the electrical component. A method of forming a silica nanofiber material includes electrospinning a fluid comprising a silica precursor and a polymer to form electrospun fibers, removing at least a portion of the polymer from the electrospun fibers to form silica nanofibers, and annealing the silica nanofibers to bind the silica nanofibers together.

BA-101 11/536,076 09/28/06 7,744,450 06/29/10

Particulate Residue Separator And A Method For Separating A Particulate Residue Stream

A particulate residue separator and a method for separating a particulate residue stream is shown and described and which includes a plenum borne by a harvesting device, and having a first, intake end, and a second, exhaust end; first and second particulate residue air streams which are formed by the harvesting device and which travel, at least in part, along the plenum and in the direction of the second end; and a baffle assembly which is located in partially occluding relation relative to the plenum, and which substantially separates the particulate residue air streams.

BA-1013 16/191,047 11/14/18

Linear Delta Systems With Additional Degrees Of Freedom And Related Methods

A linear delta system includes a frame, rails secured to the frame, linear actuators, each linear actuator coupled to a respective rail and configured to translate along a longitudinal length of the respective rail, pairs of parallel rods each operably coupled to a respective linear actuator, a platform coupled to the pairs of parallel rods, structure configured to movably couple an object to the platform; and at least one degree of freedom imparting assembly including a profiled rod extending in a direction parallel to the rails and a drive unit configured to rotate the profiled rod, wherein the at least one degree of freedom imparting assembly is configured to impart a degree of freedom to the object.

BA-1023 16/191,135 11/14/18

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Linear Delta Systems, Hexapod Systems, And Related Methods				
A linear delta system includes a support frame, rails mounted to the support frame, linear actuators, each linear actuator configured to translate along a longitudinal length of a respective rail, pairs of parallel rods each coupled to the linear actuators, a platform coupled to a longitudinal end of each of the pairs of parallel rods opposite the respective linear actuator, and an object coupled to the platform. Longitudinal axes of the rails are oriented parallel to each other and lie within a common plane or an uncommon plane. A method of forming a linear delta system includes mounting rails to a support frame, the rails having longitudinal axes that are parallel to each other and lying within a common plane, coupling a linear actuator to each of the rails, coupling a pair of parallel rods to each linear actuator, and coupling a platform to the pairs of parallel rods.				
BA-1026P	62/928,037	10/30/19		
Nuclear Fuel Elements Including Protective Structures, And Related Methods				
A nuclear fuel element comprises a core comprising a fissile element and an additional element, a first material surrounding the nuclear fuel, the first material comprising the fissile element and the additional element, the first material comprising a greater than stoichiometric amount of the additional element, and a metal around an outer portion of the nuclear fuel element. Related nuclear fuel elements, and related methods are disclosed.				
BA-1029	16/191,093	11/14/18		
Dual Linear Delta Assemblies, Linear Delta Systems, And Related Methods				
A dual linear delta assembly includes a frame, a first linear delta system, and a second linear delta system concentric with the first linear delta system. Each of the first linear delta system and the second linear delta system may include rails mounted to the frame, linear actuators, each linear actuator coupled to a respective rail of the rails and configured to translate along a longitudinal length of the respective rail, pairs of parallel rods each operably coupled to a respective linear actuator of the linear actuators, and a platform coupled to a longitudinal end of each of the pairs of parallel rods opposite the respective linear actuator of the linear actuators.				
BA-1031	16/134,784	09/18/18	10,581,481	03/03/20
Communication Device, Spread-spectrum Receiver, And Related Method Using Normalized Matched Filter For Improving Signal-to-noise Ratio In Harsh Environments				
A communication device, a method of operating a communication device, and a spread spectrum receiver are disclosed. The method includes receiving an incoming RF signal, demodulating the incoming RF signal to generate a baseband signal, filtering the baseband signal with a normalized matched filter having filter characteristics matched to a pulse-shaping filter of the transmitter that generated the incoming RF signal, and extracting a received signal from a normalized output generated by the normalized matched filter. As a result, interferences and noise from harsh environments may be suppressed.				
BA-1036P	62/990,712	03/17/20		
Triple Bubbler System, Fast-bubbling Approach, And Related Methods				
A triple bubbler system includes a first fluid probe, a second fluid probe, a third fluid probe, an gas source operably coupled to the first fluid probe, the second fluid probe, and the third fluid probe and configured to meter gas through the first fluid probe, the second fluid probe, and the third fluid probe to form bubbles at tips of each of the first fluid probe, the second fluid probe, and the third fluid probe, and a cover member disposed over the tips of the first, second, and third fluid probes and configured to at least partially prevent bubbles formed and escaping the tips of the first, second, and third fluid probes from interfering with other bubbles formed at each other tips. The bubbler system includes a thermocouple having a plurality of junctions disposed along an axis parallel to longitudinal axes of the first, second, and third fluid probes.				
BA-1047	16/840,102	04/03/20		
Methods For Manufacturing Electrochemical Sensors, And Related Electrochemical Sensors				

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Methods for manufacturing an electrochemical sensor includes forming at least one electrode by printing at least one conductive ink on a surface of at least one substrate. The conductive ink may comprise, e.g., a platinum-group metal, another transition-group metal with a high-temperature melting point, a conductive ceramic material, glass-like carbon, or a combination thereof. The electrochemical sensor may be free of another material over the at least one electrode. An electrochemical sensor, formed according to such methods, may be configured for use in harsh environments (e.g., a molten salt environment). Electrodes of the electrochemical sensor comprise conductive material formed from a printed, conductive ink. In some embodiments, at least a portion of the electrochemical sensor is free of silver, gold, copper, silicon, and polymer materials, such portion being that which is to be exposed to the harsh environment during use of the electrochemical sensor.

BA-1052	16/841,863	04/07/20		
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Methods Of Forming Near-net Shape Structures From Nonstoichiometric Oxides

A method of forming a near-net shape structure comprises forming a structure comprising non-stoichiometric metal oxide comprising at least one metal and less than a stoichiometric amount of oxygen, and electrochemically reducing the non-stoichiometric metal oxide in an electrochemical cell to form a structure having a near-net shape and comprising the at least one metal having less than about 1,500 ppm oxygen. Related methods of forming a non-stoichiometric metal oxide by sintering, annealing, or additive manufacturing, and forming a near-net shape structure from the non-stoichiometric metal oxide, as well as related electrochemical cells are also disclosed.

BA-1053P	62/887,436	08/15/19		
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Methods Of Forming A Metal Alloy, Methods Of Forming Rare Earth Elements, And Methods Of Recovering A Metal From A Waste Material

A method of forming a metal alloy. The method comprises forming a metal oxide precursor and conducting cathodic polarization of the metal oxide precursor in a molten salt electrolyte to form a metal alloy. A method of forming a rare earth element is also disclosed and comprises adding a bromide compound of a rare earth element to a molten bromide salt electrolyte and conducting cathodic polarization of the bromide compound in the molten salt electrolyte to form a rare earth element. A method of recovering a metal from a metal-containing waste material is also disclosed and comprises heating a metal-containing waste material under a hydrogen flow to form a hydrided metal material. Hydrogen is removed from the hydrided metal material to form an elemental metal or a metal oxide.

BA-1062P	62/889,084	08/20/19		
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Reference Electrodes For Molten Salt Systems, And Related Methods And Electrochemical Systems

Various embodiments of the disclosure provide reference electrodes for use in electrochemical systems (e.g., electrochemical cells) that use molten salt media as the electrolyte of choice. The reference electrodes include a metal core with an outer, solid layer of the metal's oxide. The metal-oxide, outer layer may be formed uniformly and with sufficient durability to withstand exposure to molten salt material. Thermal processes (e.g., thermal oxidation) and/or electrochemical processes (e.g., anodization) may be used to form (e.g., grow) the oxide layer directly on the outer surface of the metal core, followed by annealing to improve the uniformity of the oxide layer's composition and thickness all along the outer surface of the metal core.

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BA-132	11/464,566	08/15/06	7,879,749	02/01/11
Structures Including Catalytic Materials Disposed Within Porous Zeolite Materials, Systems And Methods For Using The Same, And Methods Of Fabricating Catalytic Structures				
<p>Catalytic structures include a catalytic material disposed within a zeolite material. The catalytic material may be capable of catalyzing the formation of methanol from carbon monoxide and/or carbon dioxide, and the zeolite material may be capable of catalyzing the formation of hydrocarbon molecules from methanol. The catalytic material may include copper and zinc oxide. The zeolite material may include a first plurality of pores substantially defined by the crystal structure of the zeolite material and a second plurality of pores dispersed throughout the zeolite material. Systems for synthesizing hydrocarbon molecules also include catalytic structures. Methods for synthesizing hydrocarbon molecules include contacting hydrogen and at least one of carbon monoxide and carbon dioxide with such catalytic structures. Catalytic structures are fabricated by forming a zeolite material at least partially around a template structure, removing the template structure, and introducing a catalytic material into the zeolite material.</p>				
BA-133	11/530,684	09/11/06	8,389,180	03/05/13
Electrolytic/fuel Cell Bundles And Systems Including A Current Collector In Communication With An Electrode Thereof				
<p>Electrolytic/fuel cell bundles and systems including such bundles include an electrically conductive current collector in communication with an anode or a cathode of each of a plurality of cells. A cross-sectional area of the current collector may vary in a direction generally parallel to a general direction of current flow through the current collector. The current collector may include a porous monolithic structure. At least one cell of the plurality of cells may include a current collector that surrounds an outer electrode of the cell and has at least six substantially planar exterior surfaces. The planar surfaces may extend along a length of the cell, and may abut against a substantially planar surface of a current collector of an adjacent cell. Methods for generating electricity and for performing electrolysis include flowing current through a conductive current collector having a varying cross-sectional area.</p>				
BA-162	11/948,272	11/30/07	8,831,220	09/09/14
Processing Module Operating Methods, Processing Modules, And Communications Systems				
ABSTRACT OF THE DISCLOSURE				
<p>A processing module operating method includes using a processing module physically connected to a wireless communications device, requesting that the wireless communications device retrieve encrypted code from a web site and receiving the encrypted code from the wireless communications device. The wireless communications device is unable to decrypt the encrypted code. The method further includes using the processing module, decrypting the encrypted code, executing the decrypted code, and preventing the wireless communications device from accessing the decrypted code. Another processing module operating method includes using a processing module physically connected to a host device, executing an application within the processing module, allowing the application to exchange user interaction data communicated using a user interface of the host device with the host device, and allowing the application to use the host device as a communications device for exchanging information with a remote device distinct from the host device.</p>				

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BA-179	11/688,930	03/21/07	7,592,291	09/22/09
A Precursor Of A Catalytic Structure, A Catalytic Structure, A Method Of Fabricating The Same, And A System And A Method For Using The Same				
<p>A precursor to a catalytic structure comprising zinc oxide and copper oxide. The zinc oxide has a sheet-like morphology or a spherical morphology and the copper oxide comprises particles of copper oxide. The copper oxide is reduced to copper, producing the catalytic structure. The catalytic structure is fabricated by a hydrothermal process. A reaction mixture comprising a zinc salt, a copper salt, a hydroxyl ion source, and a structure-directing agent is formed. The reaction mixture is heated under confined volume conditions to produce the precursor. The copper oxide in the precursor is reduced to copper. A method of hydrogenating a carbon oxide using the catalytic structure is also disclosed, as is a system that includes the catalytic structure.</p>				
BA-186	11/836,009	08/08/07	7,713,401	05/11/10
Methods For Performing Electrochemical Nitration Reactions				
ABSTRACT OF THE DISCLOSURE				
<p>A method for the electrochemical synthesis of dinitro compounds is disclosed. The method comprises using an anode to oxidize an inactive chemical mediator, such as a ferrocyanide (Fe(CN)₆⁴⁻) ion, to an active chemical mediator or oxidizing agent, such as a ferricyanide (Fe(CN)₆³⁻) ion, in the presence of a differential voltage. The oxidizing agent reacts with a nitro compound and a nitrite ion to form a geminal dinitro compound. The anode may continuously oxidize ferrocyanide to regenerate active ferricyanide, thus keeping sufficient amounts of ferricyanide available for reaction.</p>				
BA-197	11/745,319	05/07/07	8,175,578	05/08/12
Wireless Device Monitoring Methods, Wireless Device Monitoring Systems, And Articles Of Manufacture				
ABSTRACT OF THE DISCLOSURE				
<p>Wireless device monitoring methods, wireless device monitoring systems, and articles of manufacture are described. According to one embodiment, a wireless device monitoring method includes accessing device configuration information of a wireless device present at a secure area, wherein the device configuration information comprises information regarding a configuration of the wireless device, accessing stored information corresponding to the wireless device, wherein the stored information comprises information regarding the configuration of the wireless device, comparing the device configuration information with the stored information, and indicating the wireless device as one of authorized and unauthorized for presence at the secure area using the comparing.</p>				
BA-216	11/688,532	03/20/07	7,453,674	11/18/08
Method For Protecting An Electric Generator				
<p>A method for protecting an electrical generator which includes providing an electrical generator which is normally synchronously operated with an electrical power grid; providing a synchronizing signal from the electrical generator; establishing a reference signal; and electrically isolating the electrical generator from the electrical power grid if the synchronizing signal is not in phase with the reference signal.</p>				
BA-224	12/325,510	12/01/08	8,381,631	02/26/13
Laminate Armor And Related Methods				

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<u>Docket #:</u>	<u>Application #</u>	<u>Application Date</u>	<u>Patent #:</u>	<u>Grant Date</u>
BA-233	11/958,142	12/17/07	8,132,410	03/13/12
Methods And Systems For The Production Of Hydrogen				
<p>Methods and systems are disclosed for the production of hydrogen and the use of high-temperature heat sources in energy conversion. In one embodiment, a primary loop may include a nuclear reactor utilizing a molten salt or helium as a coolant. The nuclear reactor may provide heat energy to a power generation loop for production of electrical energy. For example, a supercritical carbon dioxide fluid may be heated by the nuclear reactor via the molten salt and then expanded in a turbine to drive a generator. An intermediate heat exchange loop may also be thermally coupled with the primary loop and provide heat energy to one or more hydrogen production facilities. A portion of the hydrogen produced by the hydrogen production facility may be diverted to a combustor to elevate the temperature of water being split into hydrogen and oxygen by the hydrogen production facility.</p>				
BA-246	12/238,225	09/25/08	8,308,954	11/13/12
Methods For Recovering A Polar Solvent From A Fluid Stream Contaminated With At Least One Polar Impurity				
<p>A patent was issued to Daniel Ginosar and Daniel Wendt for this invention, which aids in making biodiesel from vegetable or animal oils.</p> <p>Free fatty acids can be extracted from a low cost waste oil stream (e.g. vegetable oil or animal fats only) by alcohols to produce a clean oil stream that can be used for making biodiesel. However, the free fatty acids must be removed from the alcohol to be reused. This invention allows pure alcohol to be recovered by expanding the mixture with a near critical gas (e.g. carbon dioxide). After a minor drop in pressure, the pure alcohol can be recovered and reused in the extraction process or in other processes for making biodiesel.</p> <p>This process decreases waste production and increases the supply of renewable fuels, resulting in less waste sent to landfills/waste treatment plants and potential reductions in CO2 emissions.</p>				
BA-254	12/054,269	03/24/08	8,366,902	02/05/13
Methods And Systems For Producing Syngas				
<p>Methods and systems are provided for producing syngas utilizing heat from thermochemical conversion of a carbonaceous fuel to support decomposition of at least one of water and carbon dioxide using one or more solid oxide electrolysis cells. Simultaneous decomposition of carbon dioxide and water or steam by one or more solid-oxide electrolysis cells may be employed to produce hydrogen and carbon monoxide. A portion of oxygen produced from at least one of water and carbon dioxide using one or more solid-oxide electrolysis cells is fed as a controlled flow rate in a gasifier or combustor to oxidize the carbonaceous fuel to control the carbon dioxide to carbon monoxide ratio produced.</p>				
BA-281	12/419,901	04/07/09	9,641,216	05/02/17
Monitoring Devices And Systems For Monitoring Frequency Hopping Wireless Communications, And Related Methods				
<p>Monitoring devices and systems comprise a plurality of data channel modules coupled to processing circuitry. Each data channel module of the plurality of data channel modules is configured to capture wireless communications for a selected frequency channel. The processing circuitry is configured to receive captured wireless communications from the plurality of data channel modules and to organize received wireless communications according to at least one parameter. Related methods of monitoring wireless communications are also disclosed.</p>				
BA-298	12/188,284	08/08/08	8,737,965	05/27/14

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<u>Docket #:</u>	<u>Application #</u>	<u>Application Date</u>	<u>Patent #:</u>	<u>Grant Date</u>
Wireless Device Monitoring Systems And Monitoring Devices, And Associated Methods				
Wireless device monitoring systems and monitoring devices include a communications module for receiving wireless communications of a wireless device. Processing circuitry is coupled with the communications module and configured to process the wireless communications to determine whether the wireless device is authorized or unauthorized to be present at the monitored area based on identification information of the wireless device. Methods of monitoring for the presence and identity of wireless devices are also provided.				
BA-302	13/117,579	05/27/11	8,592,628	11/26/13
Phosphazene Additives				
An additive comprising a phosphazene compound that has at least two reactive functional groups and at least one capping functional group bonded to phosphorus atoms of the phosphazene compound. One of the at least two reactive functional groups is configured to react with cellulose and the other of the at least two reactive functional groups is configured to react with a resin, such as an amine resin or a polycarboxylic acid resin. The at least one capping functional group is selected from the group consisting of a short chain ether group, an alkoxy group, and an aryloxy group. Also disclosed are an additive resin admixture, a method of treating a wood product, and a wood product.				
BA-306	12/196,806	08/22/08	8,214,298	07/03/12
Systems And Methods For Performing Wireless Financial Transactions				
A secure computing module (SCM) is configured for connection with a host device. The SCM includes a processor for performing secure processing operations, a host interface for coupling the processor to the host device, and a memory connected to the processor wherein the processor logically isolates at least some of the memory from access by the host device. The SCM also includes a proximate-field wireless communicator connected to the processor to communicate with another SCM associated with another host device. The SCM generates a secure digital signature for a financial transaction package and communicates the package and the signature to the other SCM using the proximate-field wireless communicator. Financial transactions are performed from person to person using the secure digital signature of each person's SCM and possibly message encryption. The digital signatures and transaction details are communicated to appropriate financial organizations to authenticate the transaction parties and complete the transaction.				
BA-314D1	15/646,927	07/11/17		
Systems And Methods For Performing File Distribution And Purchase				
A secure computing module (SCM) is configured for connection with a host device. The SCM includes a processor for performing secure processing operations, a host interface for coupling the processor to the host device, and a memory connected to the processor wherein the processor logically isolates at least some of the memory from access by the host device. The SCM generates a secure digital signature for a financial transaction and enables controlled content received through the host device. File distribution is performed from a content provider to a buyer or from a reseller to a buyer. The file distribution includes a financial transaction using secure digital signatures and possibly message encryption. The digital signatures and transaction details are communicated to appropriate financial organizations to authenticate the transaction parties and complete the transaction. The controlled content is transferred to the buyer from either the content provider or the reseller.				

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<u>Docket #:</u>	<u>Application #</u>	<u>Application Date</u>	<u>Patent #:</u>	<u>Grant Date</u>
BA-358	12/510,014	07/27/09	8,342,073	01/01/13
Composite Armor, Armor System And Vehicle Including Armor System				
<p>Composite armor panels are disclosed. Each panel comprises a plurality of functional layers comprising at least an outermost layer, an intermediate layer and a base layer. An armor system incorporating armor panels is also disclosed. Armor panels are mounted on carriages movably secured to adjacent rails of a rail system. Each panel may be moved on its associated rail and into partially overlapping relationship with another panel on an adjacent rail for protection against incoming ordnance from various directions. The rail system may be configured as at least a part of a ring, and be disposed about a hatch on a vehicle. Vehicles including an armor system are also disclosed.</p>				
BA-378	12/725,142	03/16/10	8,664,150	03/04/14
Methods Of Producing Metal Oxides, A Method Of Producing Adsorption Media Including The Same, And A Precursor Of An Active Component Including The Metal Oxide				
<p>Methods of producing a metal oxide are disclosed. The method comprises dissolving a metal salt in a reaction solvent to form a metal salt/reaction solvent solution. The metal salt is converted to a metal oxide and a caustic solution is added to the metal oxide/reaction solvent solution to adjust the pH of the metal oxide/reaction solvent solution to less than approximately 7.0. The metal oxide is precipitated and recovered. A method of producing adsorption media including the metal oxide is also disclosed, as is a precursor of an active component including particles of a metal oxide.</p>				
BA-386	12/586,109	09/17/09	8,969,009	03/03/15
Identification Of Discriminant Proteins Through Antibody Profiling, Methods And Apparatus For Identifying An Individual				
<p>A method for determining a plurality of proteins for discriminating and positively identifying an individual based from a biological sample. The method may include profiling a biological sample from a plurality of individuals against a protein array including a plurality of proteins. The protein array may include proteins attached to a support in a preselected pattern such that locations of the proteins are known. The biological sample may be contacted with the protein array such that a portion of antibodies in the biological sample reacts with and binds to the proteins forming immune complexes. A statistical analysis method, such as discriminant analysis, may be performed to determine discriminating proteins for distinguishing individuals. Proteins of interest may be used to form a protein array. Such a protein array may be used, for example, to compare a forensic sample from an unknown source with a sample from a known source.</p>				
BA-420	12/769,894	04/29/10	8,502,159	08/06/13
Apparatuses And Methods For Generating Electric Fields				
<p>Apparatuses and methods relating to generating an electric field are disclosed. An electric field generator may include a semi-conductive material configured in a physical shape substantially different from a shape of an electric field to be generated thereby. The electric field is generated when a voltage drop exists across the semi-conductive material. A method for generating an electric field may include applying a voltage to a shaped semi-conductive material to generate a complex, substantially non-linear electric field. The shape of the complex, substantially non-linear electric field may be configured for directing charged particles to a desired location. Other apparatuses and methods are disclosed.</p>				
BA-440	12/952,025	11/22/10	8,701,560	04/22/14
Apparatus, System, And Method For Synchronizing A Timer Key				

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Docket #: **Application #** **Application Date** **Patent #:** **Grant Date**

A timer key relating to monitoring the countdown time of a countdown routine of an electronic device is disclosed. The timer key comprises a processor configured to respond to a countdown time associated with operation of the electronic device, a display operably coupled with the processor, and a housing configured to house at least the processor. The housing has an associated structure configured to engage with the electronic device to share the countdown time between the electronic device and the timer key. The processor is configured to begin a countdown routine based at least in part on the countdown time, wherein the countdown routine is at least substantially synchronized with a countdown routine of the electronic device when the timer key is removed from the electronic device. A system and method for synchronizing countdown routines of a timer key and an electronic device are also disclosed.

BA-440D1	14/252,531	04/14/14	9,046,268	06/02/15
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Methods For Synchronizing A Countdown Routine Of A Timer Key And Electronic Device

A timer key relating to monitoring the countdown time of a countdown routine of an electronic device is disclosed. The timer key comprises a processor configured to respond to a countdown time associated with operation of the electronic device, a display operably coupled with the processor, and a housing configured to house at least the processor. The housing has an associated structure configured to engage with the electronic device to share the countdown time between the electronic device and the timer key. The processor is configured to begin a countdown routine based at least in part on the countdown time, wherein the countdown routine is at least substantially synchronized with a countdown routine of the electronic device when the timer key is removed from the electronic device. A system and method for synchronizing countdown routines of a timer key and an electronic device are also disclosed.

BA-444	12/792,966	06/03/10	8,573,571	11/05/13
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Dissipative Structures And Related Methods

Dissipative structures include at least one panel and a cell structure disposed adjacent to the panel having interconnected cells. A deformable material, which may comprise at least one hydrogel, is disposed within at least one interconnected cell proximate to the panel. Dissipative structures may also include a cell structure having interconnected cells formed by wall elements. The wall elements may include a mesh formed by overlapping fibers having apertures formed therebetween. The apertures may form passageways between the interconnected cells. Methods of dissipating a force include disposing at least one hydrogel in a cell structure proximate to at least one panel, applying a force to the at least one panel, and forcing at least a portion of the at least one hydrogel through apertures formed in the cell structure.

BA-451	12/777,951	05/11/10	8,342,042	01/01/13
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Device For Collecting Chemical Compounds And Related Methods

A device for sampling chemical compounds from fixed surfaces and related methods are disclosed. The device may include a vacuum source, a chamber and a sorbent material. The device may utilize vacuum extraction to volatilize the chemical compounds from the fixed surface so that they may be sorbed by the sorbent material. The sorbent material may then be analyzed using conventional thermal desorption/gas chromatography/mass spectrometry (TD/GC/MS) instrumentation to determine presence of the chemical compounds. The methods may include detecting release and presence of one or more chemical compounds and determining the efficacy of decontamination. The device may be useful in collection and analysis a variety of chemical compounds, such as residual chemical warfare agent, chemical attribution signatures and toxic industrial chemicals.

BA-476	13/049,788	03/16/11	8,965,578	02/24/15
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Real Time Explosive Hazard Information Sensing, Processing, And Communication For Autonomous Operation

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<u>Docket #:</u>	<u>Application #</u>	<u>Application Date</u>	<u>Patent #:</u>	<u>Grant Date</u>
BA-476D1	14/623,997	02/17/15	9,213,934	12/15/15
<p>Methods, computer readable media, and apparatuses provide robotic mine detection. A robot intelligence kernel (RIK) includes a dynamic autonomy structure with two or more autonomy levels between operator intervention and robot initiative A mine sensor and processing module (MSPM) operating separately from the RIK perceives environmental variables indicative of a mine using subsurface preceptors. The MSPM processes mine information to determine a likelihood of a presence of a mine. A robot can autonomously modify behavior responsive to an indication of a detected mine. The behavior is modified between detection of mines, detailed scanning and characterization of the mine, developing mine indication parameters, and resuming detection. Real time messages are passed between the RIK and the MSPM. A combination of MSPM bound messages and RIK bound messages cause the robot platform to switch between modes including a calibration mode, the mine detection mode, and the mine characterization mode.</p>				
<p>Real Time Explosive Hazard Information Sensing, Processing, And Communication For Autonomous Operation</p> <p>Methods, computer readable media, and apparatuses provide robotic mine detection. A robot intelligence kernel (RIK) includes a dynamic autonomy structure with two or more autonomy levels between operator intervention and robot initiative A mine sensor and processing module (MSPM) operating separately from the RIK perceives environmental variables indicative of a mine using subsurface preceptors. The MSPM processes mine information to determine a likelihood of a presence of a mine. A robot can autonomously modify behavior responsive to an indication of a detected mine. The behavior is modified between detection of mines, detailed scanning and characterization of the mine, developing mine indication parameters, and resuming detection. Real time messages are passed between the RIK and the MSPM. A combination of MSPM bound messages and RIK bound messages cause the robot platform to switch between modes including a calibration mode, the mine detection mode, and the mine characterization mode.</p>				
BA-481	13/870,700	04/25/13	9,342,876	05/17/16
<p>Methods, Apparatuses, And Computer-readable Media For Projectional Morphological Analysis Of N-dimensional Signals</p> <p>Embodiments discussed herein in the form of methods, systems, and computer-readable media deal with the application of advanced "projectional" morphological algorithms for solving a broad range of problems. In a method of performing projectional morphological analysis, an N dimensional input signal is supplied. At least one N dimensional form indicative of at least one feature in the N dimensional input signal is identified. The N dimensional input signal is filtered relative to the at least one N dimensional form and an N dimensional output signal is generated showing results of the filtering at least as differences in the N dimensional input signal relative to the at least one N dimensional form.</p>				
BA-491	13/177,962	07/07/11	8,747,673	06/10/14
<p>Methods For Recovering A Solvent From A Fluid Volume And Methods Of Removing At Least One Compound From A Nonpolar Solvent</p> <p>A method of removing a nonpolar solvent from a fluid volume that includes at least one nonpolar compound, such as a fat, an oil or a triglyceride, is provided. The method comprises contacting a fluid volume with an expanding gas to expand the nonpolar solvent and form a gas expanded solvent. The gas expanded solvent may have a substantially reduced density in comparison to the at least one nonpolar compound and/or a substantially reduced capacity to solubilize the nonpolar compound, causing the nonpolar compounds to separate from the gas expanded nonpolar solvent into a separate liquid phase. The liquid phase including the at least one nonpolar compound may be separated from the gas expanded solvent using conventional techniques. After separation of the liquid phase, at least one of the temperature and pressure may be reduced to separate the nonpolar solvent from the expanding gas such that the nonpolar solvent may be recovered and reused.</p>				
BA-500	13/045,195	03/10/11	8,541,517	09/24/13
<p>Polymer Compositions, Polymer Films And Methods And Precursors For Forming Same</p>				

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<u>Docket #:</u>	<u>Application #</u>	<u>Application Date</u>	<u>Patent #:</u>	<u>Grant Date</u>
BA-500D1	14/014,664	08/30/13	9,080,052	07/14/15
Precursor Polymer Compositions Comprising Polybenzimidazole (as Amended)				
<p>Stable, high performance polymer compositions including polybenzimidazole (PBI) and a melamine-formaldehyde polymer, such as methylated, poly(melamine-co-formaldehyde), for forming structures such as films, fibers and bulky structures. The polymer compositions may be formed by combining polybenzimidazole with the melamine-formaldehyde polymer to form a precursor. The polybenzimidazole may be reacted and/or intertwined with the melamine-formaldehyde polymer to form the polymer composition. For example, a stable, free-standing film having a thickness of, for example, between about 5 μm and about 30 μm may be formed from the polymer composition. Such films may be used as gas separation membranes and may be submerged into water for extended periods without crazing and cracking. The polymer composition may also be used as a coating on substrates, such as metal and ceramics, or may be used for spinning fibers. Precursors for forming such polymer compositions are also disclosed.</p>				
BA-552C1	14/948,019	11/20/15	10,099,178	10/16/18
Draw Solutions And Methods Of Treating An Aqueous Liquid				
<p>A method of treating an aqueous liquid. The method comprises providing an aqueous feed liquid comprising water and at least one solute to a first side of a membrane. A draw solution comprising water and a draw solute comprising at least one of a phosphazene compound and a triazine compound is provided to a second side of the membrane. At least a portion of the water of the aqueous feed liquid is osmosed across the membrane and into the draw solution to form a diluted draw solution comprising water and the draw solute. The water of the diluted draw solution is separated from the draw solute of the diluted draw solution to form a purified water product. Draw solutes comprising phosphazene compounds and draw solutes comprising triazine compounds are also disclosed, as are methods of forming the draw solutes.</p>				
BA-560	13/183,228	07/14/11	8,891,073	11/18/14
Apparatus, System, And Method For Laser-induced Breakdown Spectroscopy				
<p>In laser-induced breakdown spectroscopy (LIBS), an apparatus includes a pulsed laser configured to generate a pulsed laser signal toward a sample, a constructive interference object and an optical element, each located in a path of light from the sample. The constructive interference object is configured to generate constructive interference patterns of the light. The optical element is configured to disperse the light. A LIBS system includes a first and a second optical element, and a data acquisition module. The data acquisition module is configured to determine an isotope measurement based, at least in part, on light received by an image sensor from the first and second optical elements. A method for performing LIBS includes generating a pulsed laser on a sample to generate light from a plasma, generating constructive interference patterns of the light, and dispersing the light into a plurality of wavelengths.</p>				
BA-583	13/480,053	05/24/12	10,363,336	07/30/19
Methods And Systems For Treating Liquids Using Switchable Solvents				

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<u>Docket #:</u>	<u>Application #</u>	<u>Application Date</u>	<u>Patent #:</u>	<u>Grant Date</u>
<p>A method of treating a liquid. The method comprises providing a feed liquid comprising at least one solvent and at least one solute to a first side of a membrane. A single-phase draw solution comprising at least one of an aminium salt, an amidinium salt, and a guanidinium salt is provided to a second side of the membrane. The at least one solvent is osmosed across the membrane and into ; . i the single-phase draw solution to form a diluted single-phase draw solution. At least one of CO₂, cs₂, and cos is removed from the diluted single-phase draw solution to form a first multiple-phase solution comprising a first liquid phase comprising the at least one solvent, and a second liquid phase comprising at least one of an amine compound, an amidine compound, and a guanidine compound. A liquid purification system is also described.</p>				

BA-583D1	16/430,073	06/03/19		
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Liquid Treatment Systems

<p>A method of treating a liquid. The method comprises providing a feed liquid comprising at least one solvent and at least one solute to a first side of a membrane. A single-phase draw solution comprising at least one of an aminium salt, an amidinium salt, and a guanidinium salt is provided to a second side of the membrane. The at least one solvent is osmosed across the membrane and into ; . i the single-phase draw solution to form a diluted single-phase draw solution. At least one of CO₂, cs₂, and cos is removed from the diluted single-phase draw solution to form a first multiple-phase solution comprising a first liquid phase comprising the at least one solvent, and a second liquid phase comprising at least one of an amine compound, an amidine compound, and a guanidine compound. A liquid purification system is also described.</p>				
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BA-585	13/311,357	12/05/11	8,731,027	05/20/14
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Methods And Apparatuses Using Filter Banks For Multi-carrier Spread Spectrum Signals

<p>A transmitter includes a synthesis filter bank to spread a data symbol to a plurality of frequencies by encoding the data symbol on each frequency, apply a common pulse-shaping filter, and apply gains to the frequencies such that a power level of each frequency is less than a noise level of other communication signals within the spectrum. Each frequency is modulated onto a different evenly spaced subcarrier. A demodulator in a receiver converts a radio frequency input to a spread-spectrum signal in a baseband. A matched filter filters the spread-spectrum signal with a common filter having characteristics matched to the synthesis filter bank in the transmitter by filtering each frequency to generate a sequence of narrow pulses. A carrier recovery unit generates control signals responsive to the narrow pulses suitable for generating a phase locked loop between the demodulator, the matched filter, and the carrier recovery unit.</p>				
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BA-585C1	14/498,035	09/26/14	9,369,866	06/14/16
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Methods And Apparatuses Using Filter Banks For Multi-carrier Spread Spectrum Signals

<p>A transmitter includes a synthesis filter bank to spread a data symbol to a plurality of frequencies by encoding the data symbol on each frequency, apply a common pulse-shaping filter, and apply gains to the frequencies such that a power level of each frequency is less than a noise level of other communication signals within the spectrum. Each frequency is modulated onto a different evenly spaced subcarrier. A demodulator in a receiver converts a radio frequency input to a spread-spectrum signal in a baseband. A matched filter filters the spread-spectrum signal with a common filter having characteristics matched to the synthesis filter bank in the transmitter by filtering each frequency to generate a sequence of narrow pulses. A carrier recovery unit generates control signals responsive to the narrow pulses suitable for generating a phase locked loop between the demodulator, the matched filter, and the carrier recovery unit.</p>				
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BA-585D1	14/051,274	10/10/13	8,861,571	10/14/14
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Methods And Apparatuses Using Filter Banks For Multi-carrier Spread Spectrum Signals

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Docket #: **Application #** **Application Date** **Patent #:** **Grant Date**

A transmitter includes a synthesis filter bank to spread a data symbol to a plurality of frequencies by encoding the data symbol on each frequency, apply a common pulse-shaping filter, and apply gains to the frequencies such that a power level of each frequency is less than a noise level of other communication signals within the spectrum. Each frequency is modulated onto a different evenly spaced subcarrier. A demodulator in a receiver converts a radio frequency input to a spread-spectrum signal in a baseband. A matched filter filters the spread-spectrum signal with a common filter having characteristics matched to the synthesis filter bank in the transmitter by filtering each frequency to generate a sequence of narrow pulses. A carrier recovery unit generates control signals responsive to the narrow pulses suitable for generating a phase locked loop between the demodulator, the matched filter, and the carrier recovery unit.

BA-659	13/534,829	06/27/12	9,018,586	04/28/15
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Apparatuses For Large Area Radiation Detection And Related Method

Apparatuses and a related method relating to radiation detection are disclosed. In one embodiment, an apparatus includes a first scintillator and a second scintillator adjacent to the first scintillator, with each of the first scintillator and second scintillator being structured to generate a light pulse responsive to interacting with incident radiation. The first scintillator is further structured to experience full energy deposition of a first low-energy radiation, and permit a second higher-energy radiation to pass therethrough and interact with the second scintillator. The apparatus further include a plurality of light-to-electrical converters operably coupled to the second scintillator and configured to convert light pulses generated by the first scintillator and the second scintillator into electrical signals. The first scintillator and the second scintillator exhibit at least one mutually different characteristic for an electronic system to determine whether a given light pulse is generated by the first scintillator or the second scintillator.

BA-670	13/359,716	01/27/12	8,871,385	10/28/14
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Electrodes Including A Polyphosphazene Cyclomatrix, Methods Of Forming The Electrodes, And Related Electrochemical Cells

An electrode comprising a polyphosphazene cyclomatrix and particles within pores of the polyphosphazene cyclomatrix. The polyphosphazene cyclomatrix comprises a plurality of phosphazene compounds and a plurality of cross-linkages. Each phosphazene compound of the plurality of phosphazene compounds comprises a plurality of phosphorus nitrogen units, and at least one pendant group bonded to each phosphorus atom of the plurality of phosphorus nitrogen units. Each phosphorus-nitrogen unit is bonded to an adjacent phosphorus-nitrogen unit. Each cross-linkage of the plurality of cross-linkages bonds at least one pendant group of one phosphazene compound of the plurality of phosphazene compounds with the at least one pendant group of another phosphazene compound of the plurality of phosphazene compounds. A method of forming a negative electrode and an electrochemical cell are also described.

BA-671	14/108,068	12/16/13	9,519,031	12/13/16
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Circuits And Methods For Impedance Determination Using Active Measurement Cancellation

Systems and methods for measuring impedance are disclosed. A delta signal and opposite delta signal are generated such that a sum of the two signals is substantially zero. The delta signal is applied across a first set of cells out of a plurality of electrochemical cells operably coupled together. The opposite delta signal is applied across a second set of cells out of the plurality of electrochemical cells, wherein the second set of cells is different from the first set of cells. A held voltage is measured across the second set of cells when the delta signal and the opposite delta signal are not being applied. A response signal is measured across the second set of cells when the delta signal and the opposite delta signal are being applied and the response signal is analyzed relative to the held voltage to determine an impedance of the second set of cells.

BA-698	13/932,873	07/01/13	10,066,962	09/04/18
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Apparatus, System, And Method For Sensor Authentication

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<u>Docket #:</u>	<u>Application #</u>	<u>Application Date</u>	<u>Patent #:</u>	<u>Grant Date</u>
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A method includes receiving an output signal from a sensor, generating a noise signal from the output signal, comparing the noise signal with a stored baseline noise signature, and reporting authentication of the sensor if the comparison is within a pre-determined error limit. A sensor authentication apparatus, comprises a processor and a memory operably coupled with the processor. Instructions, when executed, cause the processor to separate a noise signal from a measured signal, and detect a noise signature match by comparing the noise signal with at least one stored baseline noise signature associated with the sensor. A sensor authentication system comprises a sensor authentication unit and a data acquisition unit. At least one of the sensor authentication unit and the data acquisition unit is configured to compare a noise signal with a baseline noise signature to authenticate the at least one sensor from among a plurality of sensors.

BA-740	14/180,161	02/13/14	9,284,596	03/15/16
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Methods For Determining Enzymatic Activity Comprising Heating And Agitation Of Closed Volumes

Methods for determining enzymatic activity include heating a substrate solution in a plurality of closed volumes to a predetermined reaction temperature. Without opening the closed volumes, at least one enzyme is added, substantially simultaneously, to the closed volumes. At the predetermined reaction temperature, the closed volumes are agitated and then the activity of the at least one enzyme is determined. The methods are conducive for processing enzymes of high-temperature reactions, with insoluble substrates, with substrates and enzymes that do not readily intermix, and with low volumes of substrate and enzyme. Systems for processing the enzymes are also disclosed.

BA-748	14/225,306	03/25/14	10,017,843	07/10/18
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Compositions Of Particles Comprising Rare-earth Oxides In A Metal Alloy Matrix And Related Methods

A composition includes a metal alloy matrix comprising iron and a plurality of nanoparticles dispersed within the metal alloy matrix. Each nanoparticle of the plurality comprises an oxide of a rare-earth metal and at least one metal selected from the group consisting of tantalum, niobium, vanadium, and titanium. Some compositions include a metal alloy matrix comprising iron and a plurality of nanoparticles comprising at least two different oxides of rare-earth metals dispersed within the metal alloy matrix. Some methods include mixing an oxide of a rare-earth metal with a first metal and a second metal. Other methods include mixing a plurality of particles comprising at least one oxide of a rare-earth metal with a molten metal comprising iron. Each particle of the plurality may exhibit a density between about 6.9 g/cm³ and about 9.0 g/cm³.

BA-748D1	15/982,773	05/17/18		
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Compositions Of Particles Comprising Rare-earth Oxides In A Metal Alloy Matrix And Related Methods

A composition includes a metal alloy matrix comprising iron and a plurality of nanoparticles dispersed within the metal alloy matrix. Each nanoparticle of the plurality comprises an oxide of a rare-earth metal and at least one metal selected from the group consisting of tantalum, niobium, vanadium, and titanium. Some compositions include a metal alloy matrix comprising iron and a plurality of nanoparticles comprising at least two different oxides of rare-earth metals dispersed within the metal alloy matrix. Some methods include mixing an oxide of a rare-earth metal with a first metal and a second metal. Other methods include mixing a plurality of particles comprising at least one oxide of a rare-earth metal with a molten metal comprising iron. Each particle of the plurality may exhibit a density between about 6.9 g/cm³ and about 9.0 g/cm³.

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<u>Docket #:</u>	<u>Application #</u>	<u>Application Date</u>	<u>Patent #:</u>	<u>Grant Date</u>
BA-769	14/080,542	11/14/13	9,939,534	04/10/18
Methods And Apparatuses For Detection Of Radiation With Semiconductor Image Sensors				
<p>A semiconductor image sensor is repeatedly exposed to high energy photons while a visible light obstructer is in place to block visible light from impinging on the sensor to generate a set of images from the exposures. A composite image is generated from the set of images with common noise substantially removed so the composite image includes image information corresponding to radiated pixels that absorbed at least some energy from the high energy photons. The composite image is processed to determine a set of bright points in the composite image, each bright point being above a first threshold. The set of bright points is processed to identify lines with two or more bright points that include pixels therebetween that are above a second threshold and identify a presence of the high energy particles responsive to a number of lines.</p>				
BA-772	14/049,614	10/09/13	9,939,235	04/10/18
Initiation Devices, Initiation Systems Including Initiation Devices And Related Method				
<p>Initiation devices may include at least one substrate, and initiation element the positioned on a first side of the at least one substrate, and a spark gap electrically coupled to the initiation element and positioned on a second side of the at least one substrate. Initiation devices may include a plurality of substrates where at least one substrate of the plurality of substrates is electrically connected to at least one adjacent substrate of the plurality of substrates with at least one via extending through the at least one substrate. Initiation systems may include such initiation devices. Methods of igniting energetic materials include passing a current through a spark gap formed on at least one substrate of the initiation device, passing the current through at least one via formed through the at least one substrate, and passing the current through an explosive bridge wire of the initiation device.</p>				
BA-774	14/826,056	08/13/15	9,683,976	06/20/17
Containers And Systems For The Measurement Of Radioactive Gases And Related Methods				
<p>Containers for a fluid sample containing a radionuclide for measurement of radiation from the radionuclide include an outer shell having one or more ports between and interior and an exterior of the outer shell, and an inner shell secured to the outer shell. The inner shell includes a detector receptacle sized for at least partial insertion into the outer shell. The inner shell and outer shell together at least partially define a fluid sample space. The outer shell and inner shell are configured for maintaining an operating pressure within the fluid sample space of at least about 1 000 psi. Systems for measuring radioactivity in a fluid include such a container and a radiation detector received at least partially within the detector receptacle. Methods of measuring radioactivity in a fluid sample include maintaining a pressure of a fluid sample within a Marinellitype container at least at about 1000 psi.</p>				
BA-783	14/163,723	01/24/14	9,215,587	12/15/15
Methods And Apparatuses For Self-generating Fault-tolerant Keys In Spread-spectrum Systems				
<p>Self-generating fault-tolerant keys for use in spread-spectrum systems are disclosed. At a communication device, beacon signals are received from another communication device and impulse responses are determined from the beacon signals. The impulse responses are circularly shifted to place a largest sample at a predefined position. The impulse responses are converted to a set of frequency responses in a frequency domain. The frequency responses are shuffled with a predetermined shuffle scheme to develop a set of shuffled frequency responses. A set of phase differences is determined as a difference between an angle of the frequency response and an angle of the shuffled frequency response at each element of the corresponding sets. Each phase difference is quantized to develop a set of secret-key quantized phases and a set of spreading codes is developed wherein each spreading code includes a corresponding phase of the set of secret-key quantized phases.</p>				

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BA-786	15/046,979	02/18/16	10,042,397	08/07/18
Energetic Potting Materials, Electronic Devices Potted With The Energetic Potting Materials, And Related Methods				
A potted electronic device comprises an electronic device at least partially encapsulated by an energetic potting material. The energetic potting material comprises a halogenated urethane binder and a metal fuel dispersed within the halogenated urethane binder. Related energetic potting materials and methods of forming electronic devices at least partially encapsulated with the energetic potting materials are also disclosed.				
BA-793	14/050,642	10/10/13	9,481,614	11/01/16
Energetic Materials And Methods Of Tailoring Electrostatic Discharge Sensitivity Of Energetic Materials				
An energetic material comprising an elemental fuel, an oxidizer or other element, and a carbon nanofiller or carbon fiber rods, where the carbon nanofiller or carbon fiber rods are substantially homogeneously dispersed in the energetic material. Methods of tailoring the electrostatic discharge sensitivity of an energetic material are also disclosed.				
BA-794	14/693,347	04/22/15	9,488,452	11/08/16
Apparatus For Rendering At Least A Portion Of A Device Inoperable And Related Methods				
Apparatus for rendering at least a portion of a device inoperable may include a containment structure having a first compartment that is configured to receive a device therein and a movable member configured to receive a cartridge having reactant material therein. The movable member is configured to be inserted into the first compartment of the containment structure and to ignite the reactant material within the cartridge. Methods of rendering at least a portion of a device inoperable may include disposing the device into the first compartment of the containment structure, inserting the movable member into the first compartment of the containment structure, igniting the reactant material in the cartridge, and expelling molten metal onto the device. Apparatus for rendering at least a portion of a device inoperable may include a containment structure having a first compartment that is configured to receive a device therein and a movable member configured to receive a cartridge having reactant material therein. The movable member is configured to be inserted into the first compartment of the containment structure and to ignite the reactant material within the cartridge. Methods of rendering at least a portion of a device inoperable may include disposing the device into the first compartment of the containment structure, inserting the movable member into the first compartment of the containment structure, igniting the reactant material in the cartridge, and expelling molten metal onto the device.				
BA-799	15/195,313	06/28/16	10,207,956	02/19/19
Methods Of Forming Silicon Carbide By Spark Plasma Sintering				
A method of forming silicon carbide by spark plasma sintering comprises loading a powder comprising silicon carbide into a die and exposing the powder to a pulsed current to heat the powder at a rate of between about 50°C/min and about 200°C/min to a peak temperature while applying a pressure to the powder. The powder is exposed to the peak temperature for between about 30 seconds and about 5 minutes to form a sintered silicon carbide material and the sintered silicon carbide material is cooled. Related structures and methods are disclosed.				
BA-799D1	16/175,635	10/30/18	10,364,191	07/30/19
Methods Of Forming Silicon Carbide By Spark Plasma Sintering, Methods Of Forming Articles Including Silicon Carbide By Spark Plasma Sintering, And Related Structures				
A method of forming silicon carbide by spark plasma sintering comprises loading a powder comprising silicon carbide into a die and exposing the powder to a pulsed current to heat the powder at a rate of between about 50°C/min and about 200°C/min to a peak temperature while applying a pressure to the powder. The powder is exposed to the peak temperature for between about 30 seconds and about 5 minutes to form a sintered silicon carbide material and the sintered silicon carbide material is cooled. Related structures and methods are disclosed.				
BA-802	14/566,455	12/10/14	9,869,000	01/16/18
Methods Of Making Bainitic Steel Materials				

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<u>Docket #:</u>	<u>Application #</u>	<u>Application Date</u>	<u>Patent #:</u>	<u>Grant Date</u>
<p>Methods of making bainitic steels may involve austenitizing a quantity of steel by exposing the quantity of steel to a first temperature. A composition of the quantity of steel may be configured to impede formation of non-bainite ferrite, pearlite, and Widmanstätten ferrite. The quantity of steel may be heat-treated to form bainite by exposing the quantity of steel to a second, lower temperature. The second, lower temperature may be stabilized by exposing the quantity of steel to the second, lower temperature in the presence of a thermal ballast.</p>				
BA-808	14/333,362	07/16/14	9,399,194	07/26/16
<p>Methods For Treating A Liquid Using Draw Solutions</p> <p>Draw solutions comprising at least one N cycloalkyl cycloalkylamine and a secondary solvent. The N cycloalkyl cycloalkylamine comprises the chemical structure: , wherein n is 0, 1, or 2, n' is 0, 1, or 2, and each of R1 R6 is independently selected from the group consisting of an alkyl group, an alkoxy group, an acetyl group, an aryl group, a hydrogen group, a hydroxyl group, and a phosphorus containing group. Methods of treating a liquid using the draw solution are also disclosed.</p>				
BA-810	15/098,678	04/14/16	9,815,747	11/14/17
<p>Syngas Conversion To A Light Alkene And Related Methods</p> <p>Methods of producing a light alkene. The method comprises contacting syngas and tungstated zirconia to produce a product stream comprising at least one light alkene. The product stream is recovered. Methods of converting syngas to a light alkene are also disclosed. The method comprises heating a precursor of tungstated zirconia to a temperature of between about 350°C and about 550°C to form tungstated zirconia. Syngas is flowed over the tungstated zirconia to produce a product stream comprising at least one light alkene and the product stream comprising the at least one light alkene is recovered.</p>				
BA-813	14/940,561	11/13/15	9,908,823	03/06/18
<p>Flexible Energetic Materials And Related Methods</p> <p>Energetic compositions and methods of forming components from the compositions are provided. In one embodiment, a composition includes aluminum, molybdenum trioxide, potassium perchlorate, and a binder. In one embodiment, the binder may include a silicone material. The materials may be mixed with a solvent, such as xylene, de-aired, shaped and cured to provide a selfsupporting structure. In one embodiment, one or more reinforcement members may be added to provide additional strength to the structure. For example, a weave or mat of carbon fiber material may be added to the mixture prior to curing. In one embodiment, blade casting techniques may be used to form a structure. In another embodiment, a structure may be formed using 3-dimensional printing techniques.</p>				
BA-815	15/500,448	01/30/17		
<p>Methods For Separating Mixtures</p> <p>Applicant has discovered that certain separation materials (e.g., carbon-based separation materials such as mesoporous carbon-based materials) are useful for separating certain elements and isotopes thereof (e.g., protactinium (233Pa and 231Pa) and gallium (68Ga)) from mixtures containing the element. The resultant separation methods can be focused on separating the element from the mixture so as to obtain the element in pure or enriched form. Conversely, the separation methods can be focused on removing the element from the mixture so as to obtain a mixture that is devoid or has a lowered amount of the element. In some embodiments it is desirable that both (1) the element be purified or obtained in enriched form and (2) the mixture be obtained that is devoid in the element or has a lowered amount of the element. In addition to the high selectivity of the separation material for the element (e.g., protactinium (233Pa and 231Pa) and gallium (68Ga)), the separation materials also provide shielding properties in separations involving nuclear fuel applications (such as extractions involving spent nuclear fuel). Accordingly, one embodiment provides a method for separating protactinium or gallium including isotopes thereof (e.g., protactinium (233Pa and 231Pa) and gallium (68Ga)) from a corresponding mixture comprising protactinium or gallium, comprising contacting the mixture with a carbon-based separation material.</p>				
BA-830	15/744,022	07/15/16		

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<u>Docket #:</u>	<u>Application #</u>	<u>Application Date</u>	<u>Patent #:</u>	<u>Grant Date</u>
Methods And Systems For Aluminum Electroplating				
<p>Systems and methods for coating a metallic component are provided. In one embodiment, a metallic coating may be disposed in a plating bath comprising AlBr₃. The metallic coating may be coupled with, or configured as, a working electrode. A counter electrode formed of aluminum may be disposed within the plating bath. An electric current may be applied between the two electrodes resulting in the electrodeposition of aluminum on the metallic component. In one particular embodiment, the plating bath may include LiBr, KBr and CsBr, with AlBr₃ being present in an amount of approximately 80 percent or greater by weight. Various types of metals may be coated with aluminum using embodiments of the present invention. Additionally, the methods and systems described herein are amenable to coating of complex geometries.</p>				
BA-832	14/746,279	06/22/15	10,109,381	10/23/18
Methods Of Forming Triuranium Disilicide Structures, And Related Fuel Rods For Light Water Reactors				
<p>A method of forming a triuranium disilicide structure comprises forming a mixture comprising uranium particles and silicon particles. The mixture is pressed to form a compact comprising the uranium particles and the silicon particles. The compact is subjected to an arc melting process to form a preliminary triuranium disilicide structure. The preliminary triuranium disilicide structure is subjected to a comminution process to form a fine triuranium disilicide powder. The fine triuranium disilicide powder is pressed to form a green triuranium disilicide structure. The green triuranium disilicide structure is then sintered. Additional methods of forming a triuranium disilicide structure are also described, as are fuel rods for light water reactors.</p>				
BA-834	15/590,359	05/09/17	10,274,609	04/30/19
Systems And Methods For Assaying A Radioactive Gas, And Related Scintillation Cells				
<p>A radioactive gas assay system comprises a scintillation cell production assembly, a detector assembly, a computer assembly, and a scintillation cell destruction assembly. The scintillation cell production assembly is configured to produce a scintillation cell comprising a glass scintillator shell containing a volume of radioactive gas. The detector assembly is configured to receive the scintillation cell and to detect photons emitted thereby. The computer assembly is configured to receive data from the detector assembly to automatically calculate an absolute activity of the volume of radioactive gas of the scintillation cell and radiation detection efficiencies of the detector assembly. The scintillation cell destruction assembly is configured to receive the scintillation cell and to rupture the substantially non-porous glass scintillator shell to release the volume of radioactive gas. A method of assaying a radioactive gas, and a scintillation cell are also described.</p>				
BA-843	14/811,703	07/28/15	10,017,429	07/10/18
Methods Of Reducing Ignition Sensitivity Of Energetic Materials				
<p>An energetic material comprising an elemental fuel, an oxidizer or other element, and a carbon nanofiller or carbon fiber rods, where the carbon nanofiller or carbon fiber rods are substantially homogeneously dispersed in the energetic material. Methods of tailoring the electrostatic discharge sensitivity of an energetic material are also disclosed. Energetic materials including the elemental fuel, the oxidizer or other element, and an additive are also disclosed, as are methods of reducing ignition sensitivity of the energetic material including the additive. The additive is combined with the elemental fuel and a metal oxide to form the energetic material. The energetic material is heated at a slow rate to render inert the energetic material to ignition while the energetic material remains ignitable when heated at a fast rate.</p>				

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BA-847	15/340,610	11/01/16	10,533,239	01/14/20
Methods Of Recovering Rare Earth Elements From A Material				
<p>A method of recovering rare earth elements from a rare earth-containing material comprises contacting the rare earth-containing material with a solution formulated and configured to dissolve rare earth elements from the rare earth-containing material and form a solution including a plurality of rare earth elements dissolved therein. The method further includes exposing the solution including the plurality of rare earth elements dissolved therein to one of a liquefied gas or a supercritical fluid to isolate the rare earth elements from each other. Related methods of removing and purifying rare earth elements from materials and phosphor lamps are also disclosed</p>				
BA-853	15/078,784	03/23/16	10,260,156	04/16/19
System And Process For Electrochemical Upgrading Of Bio-oils And Biocrudes				
<p>A system and process are disclosed for electrochemically upgrading bio-oils and bio-crude oils to enhance yields of selected reduction products for subsequent production of bio-based fuels.</p>				
BA-860	15/653,258	07/18/17	10,614,923	04/07/20
Methods Of Forming Structures And Fissile Fuel Materials By Additive Manufacturing				
<p>A method of forming one or more structures by additive manufacturing comprises introducing a first layer of a powder mixture comprising graphite and a fuel on a surface of a substrate. The first layer is at least partially compacted and then exposed to laser radiation to form a first layer of material comprising the fuel dispersed within a graphite matrix material. At least a second layer of the powder mixture is provided over the first layer of material and exposed to laser radiation to form inter-granular bonds between the second layer and the first layer. Related structures and methods of forming one or more structures are also disclosed.</p>				
BA-860D1	16/801,011	02/25/20		
Methods Of Forming Structures And Fissile Fuel Materials By Additive Manufacturing				
<p>A method of forming one or more structures by additive manufacturing comprises introducing a first layer of a powder mixture comprising graphite and a fuel on a surface of a substrate. The first layer is at least partially compacted and then exposed to laser radiation to form a first layer of material comprising the fuel dispersed within a graphite matrix material. At least a second layer of the powder mixture is provided over the first layer of material and exposed to laser radiation to form inter-granular bonds between the second layer and the first layer. Related structures and methods of forming one or more structures are also disclosed.</p>				
BA-869	14/841,114	08/31/15	10,053,887	08/21/18
Protective Barriers And Related Methods				
<p>Protective barriers for protecting assets (e.g., electrical power transformers and other substation components). The protective barrier may include a lower portion and an upper portion. The lower portion may include first and second laterally spaced A-frame structures having a first protective member assembly extending between aligned legs of the respective A-frame structures on one side thereof. The first protective member assembly may include a first plurality of substantially horizontally extending protective members oriented at an angle relative to a horizontal plane. The first and second A-frame structure may have a second protective member assembly extending between aligned legs of the respective A-frame structures on an opposing side thereof. The upper portion may comprise a third protective member assembly. Methods of making a protective are also disclosed.</p>				
BA-870	15/177,528	06/09/16	10,195,543	02/05/19
Methods And Systems For Treating A Switchable Polarity Material, And Related Methods Of Liquid Treatment				

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<u>Docket #:</u>	<u>Application #</u>	<u>Application Date</u>	<u>Patent #:</u>	<u>Grant Date</u>
BA-873	15/235,895	08/12/16	9,969,553	05/15/18
<p>Hopper Apparatuses For Processing A Bulk Solid, And Related Systems And Methods</p> <p>A hopper apparatus comprises a movable wall comprising opposing walls movably connected to a support assembly and oriented at acute angles relative to a central vertical axis of the support assembly, and movement control devices configured and positioned to move the opposing walls along the support assembly to control dimensions of a discharge outlet at least partially defined by converging ends of the opposing walls; a liner assembly comprising liner structures at least partially overlying inner surfaces of the opposing walls and configured to remain at least partially stationary relative to the opposing walls during movement of the opposing walls; and pressure sensors between the inner surfaces of opposing walls and portions of the liner structures thereover. A bulk solids processing system and a method of processing a bulk solid are also described.</p>				
BA-875	15/659,396	07/25/17	10,620,100	04/14/20
<p>Non-contact Velocity Measurement Instruments And Systems, And Related Methods</p> <p>Methods for calibration of non-contact velocity measurements and systems for implementing the same are described. Generally, the method comprises inducing a shock wave into a sample at a stress intensity that varies across the sample's elastic limit, which corresponds to the elastic-plastic state transition of the sample. That transition state may be at the sample's Hugoniot elastic limit. The velocity of the sample is measured using a non-contact velocity measurement instrument such as a velocimeter. The measurement may be compared to a predicted velocity or a velocity measurement made by another system to determine calibration parameters.</p>				
BA-879	15/827,891	11/30/17		
<p>Sensors For Measuring Thermal Conductivity And Related Methods</p> <p>A sensor for measuring thermal conductivity includes an insulator, a test material over the insulator, a conductor over the test material, and a gas within an open volume adjacent the test material and the conductor. An electrical source is configured to provide an alternating current through the conductor to heat the test material. Leads are connected to the conductor and configured to connect to a voltmeter. A method of measuring thermal conductivity includes disposing the sensor in a reactor core in which a nuclear fuel undergoes irradiation and radioactive decay. An alternating current is provided from the electrical source through the conductor to heat the test material. A voltage is measured as a function of time at the leads connected to the conductor. A thermal conductivity of the test material is calculated based on the voltage measured as a function of time. Methods of forming a sensor are also disclosed.</p>				
BA-885	15/349,654	11/11/16		
<p>Systems And Methods For Assaying Nuclear Fuel</p> <p>A nuclear fuel assay system comprises a nuclear fuel assembly comprising structures containing nuclear fuel, and a neutron collar surrounding sides of the nuclear fuel assembly and comprising pressurized 4He scintillation detectors. A system for assaying nuclear fuel, and a method of quantifying nuclear material are also described.</p>				
BA-886	15/363,510	11/29/16	10,114,130	10/30/18
<p>Detectors For Use With Particle Generators And Related Assemblies, Systems And Methods</p>				

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<u>Docket #:</u>	<u>Application #</u>	<u>Application Date</u>	<u>Patent #:</u>	<u>Grant Date</u>
BA-894	15/909,505	03/01/18		
<p>Neutron detectors for measuring a neutron yield of a neutron generator may include at least one particle counter disposed in a housing and at least one removable cartridge for receiving at least one collection medium. The at least one removable cartridge configured to be at least partially inserted into the housing to position the collection medium proximate the at least one particle counter. Detector assemblies for evaluating an output of a particle generator may include a housing and a plurality of cartridges that may be selectively received in the housing. Methods of detecting an output of a neutron source include inserting a collection medium into a cartridge, positioning the collection medium proximate a neutron source, and inserting the cartridge with the collection medium into a housing of a neutron yield detector.</p>				
<p>Methods And Apparatus For Additively Manufacturing Structures Using In Situ Formed Additive Manufacturing Materials</p> <p>A method of additively manufacturing a structure comprises nuclear reactor comprising disposing a feed material on a surface of a substrate in a reaction vessel, disposing at least one material formulated and configured to react with the feed material in the reaction vessel, and exposing the feed material and the at least one material to energy from an energy source to react the feed material and the at least one material to form an additive manufacturing material and reaction by-products. The additive manufacturing material is separated from the reaction by-products and exposed to energy from the energy source to form inter-granular bonds between particles of the additive manufacturing material and form a layer of a structure comprising the additive manufacturing material. Related apparatuses and methods are disclosed.</p>				
BA-901	15/593,691	05/12/17		
<p>Systems, Devices And Methods For Communicating Data Over Circularly Pulse-shaped Waveforms</p> <p>Circularly pulse-shaped waveforms for communication systems are disclosed herein including a single carrier modulation in which pulse-shaping is performed using a circular convolution by the transmitter for various modulation schemes. A transmitter, related method and corresponding receiver are also disclosed for demodulation of the single carrier circularly pulse-shaped signal and data extraction.</p>				
BA-902	15/890,837	02/07/18		
<p>Scintillation Compositions And Related Hydrogels For Isotopic Neutron Emitters And Antineutrino Detection, And Related Detection Systems And Methods</p> <p>Scintillation compositions comprising a gadolinium coordination compound and a scintillation compound in a polymer matrix material. The scintillation compound comprises strontium diiodide, fac-tris(2-phenylpyridine)iridium (Ir(ppy)₃), a quinine compound, or combinations thereof, or 2-(4-biphenyl)-5-phenyl-1,3,4-oxadiazole (PBD), 2-(4-tert-butylphenyl)-5-(4-phenylphenyl)-1,3,4-oxadiazole (b-PBD), 2,5-diphenyl oxazole (PPO), 1,4-bis(5-phenyloxazol-2-yl) benzene (POPOP), or combinations thereof. Hydrogels comprising the gadolinium coordination compound and scintillation compound in a polymer matrix are also disclosed, as are related systems and methods.</p>				
BA-908	16/651,738	09/28/18		
<p>Methods And Systems For The Electrochemical Reduction Of Carbon Dioxide Using Switchable Polarity Materials</p> <p>A method of electrochemically reducing CO₂ comprises introducing a first feed stream comprising H₂O to a positive electrode of an electrolysis cell comprising the positive electrode, a negative electrode, and a proton conducting membrane. A second feed stream comprising a solvent and a non polar form of a switchable polarity material is directed into a CO₂ capture apparatus. A third feed stream comprising CO₂ is directed into the CO₂ capture apparatus to interact with the second feed stream and form a first product stream comprising the solvent and a polar form of the switchable polarity material. The first product stream is introduced to the negative electrode. A potential difference is applied between the positive electrode and the negative electrode to convert the polar form of the switchable polarity material into CO₂ and the non-polar form and to form products from the CO₂ and the solvent. A CO₂ treatment system is also described.</p>				
BA-914	15/495,625	04/24/17		

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<u>Docket #:</u>	<u>Application #</u>	<u>Application Date</u>	<u>Patent #:</u>	<u>Grant Date</u>
Methods Of Preserving A Microalgae Biomass				
<p>A method of preserving a biomass. The method comprises adding an acid solution to a biomass comprising microalgae to form an acidified microalgae biomass composition. The acidified microalgae biomass composition is stored under anaerobic conditions without inoculating the acidified microalgae biomass composition with bacteria. An additional method of preserving a biomass comprises storing the acidified microalgae biomass composition under anaerobic conditions and exposing the acidified microalgae biomass composition to carbon dioxide, nitrogen, or a combination thereof to produce a coproduct comprising succinic acid. Yet another method of preserving a biomass comprises storing the acidified microalgae biomass composition under anaerobic conditions and in the presence of carbon dioxide. A preserved biomass is also disclosed.</p>				
BA-920	16/388,272	04/18/19		
Methods Of Forming Alloys By Reducing Metal Oxides				
<p>A method of forming an alloy includes disposing a first metal oxide and a second metal oxide in a molten salt. The molten salt is in contact with a working electrode and a counter electrode. An electrical potential is applied between the counter electrode and the working electrode to co-reduce the first metal oxide and the second metal oxide to form a first metal and a second metal, respectively.</p>				
BA-925	15/670,921	08/07/17	10,420,132	09/17/19
Devices, Base Stations, And Methods For Communicating Scheduling Requests Via An Underlay Control Channel In A Wireless Communication System				
<p>Wireless communication systems, base stations, and user equipment are disclosed that enable communication of scheduling requests via an underlay control channel that has an energy below a noise level of the spectrum. The scheduling requests may be sent and received at anytime, including during downlink and uplink data communication periods of the base station.</p>				
BA-939	16/564,552	09/09/19		
Nuclear Fuel Elements And Methods Of Preserving A Nuclear Fuel				
<p>A method of preserving a nuclear fuel includes exposing a surface of a fuel element comprising aluminum to a phosphorus-containing acid and reacting the phosphorus-containing acid with the aluminum to form aluminum phosphate (AlPO₄). A nuclear fuel element includes a nuclear fuel and a shell surrounding the nuclear fuel. The shell comprises aluminum phosphate.</p>				
BA-941	16/483,631	02/01/18		
Methods And Systems For Hydrogen Gas Production Through Water Electrolysis, And Related Electrolysis Cells				
<p>A method of producing hydrogen gas comprises introducing gaseous water to an electrolysis cell comprising a positive electrode, a negative electrode, and a proton-conducting membrane between the positive electrode and the negative electrode. The proton-conducting membrane comprises an electrolyte material having an ionic conductivity greater than or equal to about 10⁻² S/cm at one or more temperatures within a range of from about 150°C to about 650°C. The gaseous water is decomposed using the electrolysis cell. A hydrogen gas production system and an electrolysis cell are also described.</p>				
BA-943	15/971,767	05/04/18		
Differential Neutron Spectrum Generator And Related Methods And Systems				

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<u>Docket #:</u>	<u>Application #</u>	<u>Application Date</u>	<u>Patent #:</u>	<u>Grant Date</u>
BA-945	16/529,298	08/01/19		
Methods For Electrochemical Hydrogenation And Methods Of Forming Membrane Electrode Assemblies				
<p>A method for electrochemical hydrogenation comprises introducing an organic feed material to an electrochemical cell. The electrochemical cell comprises a membrane electrode assembly comprising an anion exchange membrane, a cathode in electrical contact with a first side of the anion exchange membrane, and an anode in electrical contact with a second side of the anion exchange membrane opposite the first side of the anion exchange membrane. A current passes through the membrane electrode assembly to convert molecules in the organic feed material to a reduced product comprising reduced molecules containing a higher proportion of hydrogen than the organic feed material. A method of forming a membrane electrode assembly comprises forming an ink mixture comprising carbon and a resin, providing droplets of the ink mixture on a substrate to form a decal, and disposing the decal in contact with an anion exchange membrane.</p>				
BA-947	15/400,948	01/06/17	10,196,708	02/05/19
Engineered Microbes For Rare Earth Element Adsorption				
<p>This disclosure provides engineered microbes modified such that the surface of the microbe contains one or more rare earth element (REE) binding ligands, as well as methods of use thereof.</p>				
BA-949	16/484,776	02/09/18		
Methods And Systems For Syngas Production And For Efficient, Flexible Energy Generation				
<p>Methods for producing syngas (e.g., H₂ and CO) include introducing a stream comprising H₂O and CO₂ to a high-temperature co-electrolysis (HTCE) unit. A CO₂ sweep gas is also introduced to the HTCE unit. Both H₂O and CO₂ are reduced in the HTCE unit to form the syngas and to form O₂ that is swept away from the HTCE unit by the CO₂ sweep gas, and the O₂ and CO₂ are then introduced to a combustion device (e.g., a gasifier), which may be configured to generate electrical power, as a result of combusting a carbonaceous fuel in the presence of the O₂ and CO₂. The HTCE unit is powered at least in part by power from an electricity-generating sub-system (e.g., at least one nuclear power plant). Related systems are also disclosed.</p>				
BA-950	16/484,401	01/19/18		
Energy Storage Systems Including Thermal Storage Tanks				
<p>Energy storage systems include a heat source and a thermal energy storage system to store thermal energy produced by the heat source. The thermal energy storage system includes a first tank containing a first salt having a first melting temperature and a second tank containing a second salt having a second melting temperature. At least one input conduit is configured for transferring thermal energy from the heat source to the first tank and second tank. A first output conduit is in thermal communication with the first tank. A second output conduit is in thermal communication with the second tank. Additional energy storage systems include a heat booster positioned and configured to add thermal energy to a heated heat transfer fluid prior to reaching a tank containing at least one thermal storage material. Methods include transferring thermal energy from a thermal energy source to a plurality of thermal energy storage tanks.</p>				
BA-953	15/644,118	07/07/17	10,423,151	09/24/19
A Controller Architecture And Systems And Methods For Implementing The Same In A Networked Control System				

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<u>Docket #:</u>	<u>Application #</u>	<u>Application Date</u>	<u>Patent #:</u>	<u>Grant Date</u>
BA-965	16/131,967	09/14/18		
Intelligent, Adaptive Control System And Related Methods For Integrated Processing Of Biomass				
Adaptive control systems and methods of using the same to control aspects of material processing systems are described. The adaptive control systems may incorporate techniques that use heuristic modeling, and apply those techniques to control processing of biomass feedstock.				
BA-967	16/290,511	03/01/19		
Consequence Driven Cyber Informed Engineering And Related Systems And Methods				
Embodiments of the disclosure relate to a computer-implemented consequence-driven cyber-informed engineering tool for performing and reporting consequence-based prioritization, system organization, consequence-based targeting, and mitigation and protection. Embodiments of a CCE tool may perform one or more steps of defining a target industrial control system (ICS), wherein the target ICS includes operational goals, critical functions, and critical services; determining one or more scored high consequence events (HCE) associated with the defined target ICS; prioritizing the scored HCEs according to an HCE severity index; and updating a dashboard with one or more representations of the prioritized HCEs, wherein the updated dashboard is associated with the CCE tool and presented at a display.				
BA-971	15/886,041	02/01/18		
Electrochemical Cells For Direct Oxide Reduction, And Related Methods				
A method of direct oxide reduction includes forming a molten salt electrolyte in an electrochemical cell, disposing at least one metal oxide in the electrochemical cell, disposing a counter electrode comprising a material selected from the group consisting of osmium, ruthenium, rhodium, iridium, palladium, platinum, silver, gold, lithium iridate, lithium ruthenate, a lithium rhodate, a lithium tin oxygen compound, a lithium manganese compound, strontium ruthenium ternary compounds, calcium iridate, strontium iridate, calcium platinite, strontium platinite, magnesium ruthenate, magnesium iridate, sodium ruthenate, sodium iridate, potassium iridate, and potassium ruthenate in the electrochemical cell, and applying a current between the counter electrode and the at least one metal oxide to reduce the at least one metal oxide. Related methods of direct oxide reduction and related electrochemical cells are also disclosed.				
BA-975	15/847,757	12/19/17		
Methods Of Forming Metals Using Ionic Liquids				
A method of forming an elemental metal (e.g., a rare-earth element) includes forming a multicomponent solution comprising an ionic liquid, a secondary component, and a metal-containing compound. The multicomponent solution is contacted with at least a first electrode and a second electrode. A current is passed between the first electrode to the second electrode through the multicomponent solution. The metal-containing compound is reduced to deposit the elemental metal therefrom on the first electrode.				
BA-987	16/254,401	01/22/19		
Methods Of Recovering Rare Earth Elements				
A method of recovering a rare earth element. The method comprises dissolving a rare earth element magnetic material in a dissolution organic solvent and a β -diketone compound to form a dissolved rare earth element mixture. A rare earth element of the rare earth element magnetic material and the β -diketone compound are reacted to form a β -diketonate chelate complex and the dissolution organic solvent is removed. The β -diketonate chelate complex is removed using a separation organic solvent, and the β -diketonate chelate complex is recovered. Additional methods are also disclosed.				

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BA-988	16/144,153	09/27/18		
Systems, Devices And Methods For Communicating Data With Unmanned Aerial Vehicles Using An Underlay Broadcasting Channel				
<p>An unmanned aerial vehicle (UAV) and base station are disclosed that communicate within a first cell via schedule requests to set up transmission of up-link data. The UAV additionally communicates up-link data via a grant-free underlay broadcast channel to one or more neighboring base stations of the terrestrial cellular network. Transmitters, receivers, related methods are also disclosed for modulation and demodulation of the transmission packets.</p>				
BA-990	16/582,914	09/25/19		
Ultrasonic Sensors And Methods Of Using The Ultrasonic Sensors				
<p>An ultrasonic sensor comprises a transducer in operable communication with a power source, a waveguide comprising a metal and at least one of a fissile material or a fertile material in operable communication with the transducer and configured to propagate and reflect acoustic waves generated by the transducer, wherein the transducer is configured to convert reflected acoustic waves to an electric signal, a thermally insulative material proximate the waveguide, and a control system in operable communication with the transducer, the control system configured to determine at least a temperature of the waveguide based on the reflected acoustic waves. Related methods are also disclosed.</p>				
CW-10-19				
Scan+				
<p>SCAN+ is a software application specifically designed to control the positioning of a gamma spectrometer by a two-dimensional translation system above spent fuel bundles located in a sealed spent fuel cask. The gamma spectrometer collects gamma spectrum information for the purpose of spent fuel cask fuel loading verification. SCAN+ performs manual and automatic gamma spectrometer positioning functions as well as exercising control of the gamma spectrometer data acquisition functions. Cask configuration files are used to determine the positions of spent fuel bundles. Cask scanning files are used to determine the desired scan paths for scanning a spent fuel cask allowing for automatic unattended cask scanning that may take several hours.</p>				
CW-12-06				
Dynamic Attack Tree Tool For Risk Assessments				
<p>DATT enables interactive visualization, qualitative analysis and recording of cyber and other forms of risk. It facilitates dynamic risk-based approaches (as opposed to static compliance-based) to security and risk management in general. DATT allows decision makers to consistently prioritize risk mitigation strategies and quickly see where attention is most needed across the enterprise.</p>				
CW-12-08				
Fracturing And Liquid Convection (falcon)				
<p>FALCON has been developed to enable simulation of the tightly coupled fluid-rock behavior in hydrothermal and engineered geothermal system (EGS) reservoirs, targeting the dynamics of fracture stimulation, fluid flow, rock deformation, and heat transport in a single integrated code, with the ultimate goal of providing a tool that can be used to test the viability of EGS in the United States and worldwide.</p>				
CW-13-02				
Sensor Authentication: Embedded Processor Code				

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Described is the c code running on the embedded Microchip 32bit PIC32MX575F256H located on the INL developed noise analysis circuit board. The code performs the following functions: Controls the noise analysis circuit board preamplifier voltage gains of 1, 10, 100, 1000? Initializes the analog to digital conversion hardware, input channel selection, Fast Fourier Transform (FFT) function, USB communications interface, and internal memory allocations? Initiates high resolution 4096 point 200 kHz data acquisition? Computes complex 2048 point FFT and FFT magnitude.? Services Host command set? Transfers raw data to Host? Transfers FFT result to host? Communication error checking

CW-13-03

Sensor Authentication: Graphical User Interface Code

Described is the sensor authentication host application software that runs on a standard PC or Laptop under the XP operating system. The application was written using National Instruments Labview. The code performs the following functions: Generates and send commands from the noise analysis command set to the noise analysis circuit board periodically or upon operator's request.? Initializes and receives large data packets from the noise analysis circuit board over the USB interface.? Computes a frequency domain X axis for each FFT data packet and converts the FFT data to log scale if desired.? Multiplies the FFT point by point with a mask to zero out unwanted frequency spectra.? Computes and saves a time averaged signature from a known sensor.? Computes the difference between the time averaged unknown signature and the time averaged known signature. Sums the absolute value of the differences to compute a degree of fit between the known and the unknown.? Performs the above operations continuously at an operator defined time interval.? Displays in real time: a) the FFT received from the noise analyzer board, b) the unknown, the signature, and the mask, c) the degree of fit between the signature and the unknown, and d) miscellaneous system control parameters.

CW-13-13

Morphohawk

MorphoHawk applies projectional mathematical morphology in a fundamentally new way. MorphoHawk extracts object information from digital images by filtering with simple geometrical figures such as rectangles or simple curves. Two core algorithms are used to accomplish this function.

CW-15-06

Gauss Xi

While a number of spectral analysis programs use computationally simpler summing methods, GAUSS XI models spectral peaks as Gaussian functions above a line segment representing the Compton continuum, using the Levenberg-Marquardt non-linear least-squares algorithm. Compared to summing methods, the non-linear least-squares methods are especially useful in the analysis of complex spectra with multiple overlapping peaks. Because GAUSS XI is interactive, the user receives immediate visual feedback on peak-fit quality. The user can easily adjust input parameters like the fit-region limits, and re-fit the spectral data. For each peak, GAUSS XI reports the peak height, peak width, net peak area, and the related uncertainties. If the spectrum energy scale has been calibrated, GAUSS XI reports peak centroids, peak widths, and their uncertainties in energy units as well. While GAUSS XI is designed for hand-analysis of spectra, to give the user nearly complete control, it also provides automated methods for energy calibration, peak and region finding, and peak and region labeling. GAUSS XI also provides tools for visually comparing, gain-shifting, adding, subtracting, and scaling gamma-ray spectra. Irregular, non-Gaussian-shaped gamma-ray peaks, e.g. Ge inelastic scattering peaks, can be analyzed with an alternative summing method included in GAUSS XI.

CW-18-02

Gas Emulation Demo (gased)

A simple physics gas network emulation and control logic design.

CW-18-05 V1

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LIT-PI-099	09/554,708	07/31/00	6,887,283	05/03/05
Transmission Route Engineering Analysis And Design				
<p>INL's Transmission Route Engineering Analysis and Design [tool] (TREAD) is a tool meant for the design and routing of new transmission lines. TREAD is capable of taking an arbitrarily large amount of surface layers represented as geographical files and then using a modified version of Dijkstra's Algorithm for finding the best path. TREAD is also capable of interacting with different weather models in order to gather weather data about the locations that are being routed to. This weather data is then used in conjunction with INL's General Line Ampacity State Solver.</p>				
LIT-PI-099	60/094,076	07/24/98		
Process For Producing Biodiesel, Lubricants, And Fuel And Lubricant Additives In A Critical Fluid Medium				
<p>A process for producing alkyl esters useful in biofuels and lubricants by transesterifying glyceride- or esterifying free fatty acid-containing substances in a single critical phase medium is disclosed. The critical phase medium provides increased reaction rates, decreases the loss of catalyst or catalyst activity and improves the overall yield of desired product. The process involves the steps of dissolving an input glyceride- or free fatty acid-containing substance with an alcohol or water into a critical fluid medium; reacting the glyceride- or free fatty acid-containing substance with the alcohol or water input over either a solid or liquid acidic or basic catalyst and sequentially separating the products from each other and from the critical fluid medium, which critical fluid medium can then be recycled back in the process. The process significantly reduces the cost of producing additives or alternatives to automotive fuels and lubricants utilizing inexpensive glyceride- or free fatty acid-containing substances, such as animal fats, vegetable oils, rendered fats, and restaurant grease.</p>				
LIT-PI-557	09/583,632	05/31/00	6365873	04/02/02
Apparatus For The Concurrent Inspection Of Partially Completed Welds				
<p>An apparatus for the concurrent inspection of partially completed welds is described in which is utilized in combination with a moveable welder for forming a partially completed weld, and an ultrasonic generator mounted on a moveable welder in which is reciprocally moveable along a path of travel which is laterally disposed relative to the partially completed weld.</p>				
LIT-PI-570	09/627,462	07/28/00	6,544,690	04/08/03
Weld Inspection Sensor Package With Scanning Transducer				
<p>An apparatus for the concurrent inspection of partially completed welds is described in which is utilized in combination with a moveable welder for forming a partially completed weld, and an ultrasonic generator mounted on a moveable welder in which is reciprocally moveable along a path of travel which is laterally disposed relative to the partially completed weld.</p>				
Self-doped Molecular Composite Battery Electrolytes				

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This invention is in solid polymer-based electrolytes for battery applications. It uses molecular composite technology, coupled with unique preparation techniques to render a self-doped, stabilized electrolyte material suitable for inclusion in both primary and secondary batteries. In particular, a salt is incorporated in a nano-composite material formed by the in situ catalyzed condensation of a ceramic precursor in the presence of a solvated polymer material, utilizing a condensation agent comprised of at least one cation amenable to SPE applications. As such, the counterion in the condensation agent used in the formation of the molecular composite is already present as the electrolyte matrix develops. This procedure effectively decouples the cation loading levels required for maximum ionic conductivity from electrolyte physical properties associated with condensation agent loading levels by utilizing the inverse relationship discovered between condensation agent loading and the time domain of the aging step.
