

U.S. PATENTS AWARDED

1. **“Peripheral Vision Helmet” (notice of allowance received)**
Inventor: Joel A. Diemer
Abstract: An apparatus for providing enhanced peripheral vision to a wearer of a helmet in accordance with the present invention includes at least one lens member adapted to be received at a predetermined location in the helmet. The lens member is operable to direct light from a side portion of the helmet to a location adjacent the eyes of a wearer of the helmet.
2. **“Speaker Identification in the Presence of Packet Losses” (notice of allowance received)**
Inventors: Deva Borah and Phillip DeLeon
Abstract: Gaussian mixture model (GMM)-based speaker identification systems have proved remarkably accurate for large populations using reasonable lengths of high-quality test utterances. Test utterances, however, acquired from cellular telephones or over the Internet (VoIP) may have dropouts due to packet loss. It has been demonstrated that for small packet sizes, these losses can result in degraded accuracy of the speaker identification system. It is shown that by training the GMM model with lossy speech packets, corresponding to the loss rate experienced by the speaker to be identified, significant performance improvement is obtained. In order to avoid the prior estimation of the packet loss rate experienced by the test subject, an algorithm is proposed to identify the user based on maximizing the *a posteriori* probability over the GMM models of the users trained with several packet loss rates. It is shown that the proposed algorithm provides excellent identification performance.
3. **“Subsurface Drip Irrigation Installer” (notice of allowance received)**
Inventor: Jose F. Makk
Abstract: A subsurface Drip Irrigation Installer for installing a conduit below a ground surface. A portable vibrating compactor and a series of rollers provide a “seamless” finish to the ground.
4. **“Completely Transportable Erasable Memory Apparatus and Method” (U.S. Patent 7,570,533 B1 issued Aug. 4, 2009)**
Inventors: Michael Simmons, Gregory Cooper, David Gorman, and Tracy Hooker
Abstract: The present invention relates to methods and apparatuses for providing data storage which can be completely erased to prevent access to previously stored data.
5. **“Copper-Inducible Promoter System” (U.S. Patent #7,491,812 issued Feb. 17, 2009)**
Inventors: Glenn Kuehn, Hiranya Roychowdhury, Maria Ordaz, and Kristina Dominguez-Trujillo
Abstract: The invention relates to an improved copper-inducible promoter system in yeast for the controlled expression of recombinant genes.
6. **“Method and Apparatus for Improving Network Connection Security with One or More Cross-Wired Adapters) (U.S. Patent #7,377,819 B1 issued May 27, 2008)**
Inventors: Gregory Cooper and David Gorman
Abstract: A method and apparatus for improving network connection security. An adapter having a cross-wiring section which alters the pin out of the network from a standard wiring

pattern to a non-standard wiring pattern is preferably connected to two or more connection points for the network

7. **“Nanocomposite for Enhanced Rectification” (U. S. Patent #7,358,291 B2 issued Apr. 15, 2008)**

Inventors: Seamus. A. Curran, Amanda V. Ellis, Wudyalew T. Wondmagegn, and James L. Dewald

Abstract: Enhanced band bending materials for use in rectifying contacts comprising metal nanoparticles and a semiconducting polymer that is soluble in common organic solvents including, for example, a gold-polymeric nanocomposite comprising gold nanoparticles in poly (m-phenylenevinylene-co-2,5 dioctoxy-p-phenylenevinylene (“PmPV”). The nanocomposite material provides for enhanced Schottky barriers.

8. **“Treatment of Arsenic-Contaminated Water Using Akaganeite Adsorption” (U.S. Patent #7,314,569 issued Jan. 1, 2008)**

Inventors: Fernando Cadena C. and Michael D. Johnson

Abstract: The present invention relates to the use of akaganeite-coated carrier media for the adsorptive removal of arsenic from water.

9. **“Liquid Fertilizer from Waste Using Successive Extraction and Accelerated Bioleaching” (filed Oct. 3, 2007)**

Inventor: Zohrab A. Samani

Abstract: The invention relates to methods and apparatuses for the production of organic liquid fertilizer from waste using a two-way process. The first phase comprises a successive extraction process whereby liquid leachate is drained from one plant or storage container and the process subsequently restarted with new fresh water. The second phase comprises an accelerated bioleaching process wherein plant material is stored in a solid bed similar to a batch process, and a leachate (e.g. water and bacteria) is re-circulated through the solid bed until the process of hydrolysis and acidification results in dissolution of organic material into the re-circulating leachate. The leachate is thus concentrated without losing the nutrient and is subsequently used as an organic fertilizer.

10. **“Electroactive Microspheres and Methods” (U.S. Patent #7,176,036 issued Feb. 13, 2007)**

Inventors: Joseph Wang, Ronen Polsky, and Kathryn L. Turner

Abstract: Methods and devices for electrochemical detection of a specific binding pair member utilizing a microsphere with an incorporated electroactive marker, wherein a member of the specific binding pair to be detected is bound, directly or through one or more intermediates, to the microsphere. Multiple specific binding pair members may be detected by use of electrochemically distinguishable electroactive markers. Microspheres with incorporated electroactive markers may include one or more functional groups for binding members of specific binding pairs, and are preferably insoluble in aqueous solvents but soluble in selected organic solvents.

11. **“Optical Devices and Methods Employing Nanoparticles, Microcavities, and Semicontinuous Metal Films” (U.S. Patent #7,123,359 B2 issued Oct. 17, 2006)**

Inventors: Robert L. Armstrong, Vladimir M. Shalaev, Harold V. Smith, Andrey K. Sarychev,

and Z. Charles Zing

Abstract: An optical sensing enhancing material (and corresponding method of making) comprising: a medium, the medium comprising a plurality of aggregated nanoparticles comprising fractals; and a microcavity, wherein the medium is located in a vicinity of the microcavity. Also an optical sensor and sensing method comprising: providing a doped medium, the medium comprising a plurality of aggregated nanoparticles comprising fractals, with the material; locating the doped medium in the vicinity of a microcavity ; exciting the doped medium with a light source; and detecting light reflected from the doped medium. Also an optical sensing enhancing material comprising a medium, the medium comprising a semicontinuous metal film of randomly distributed metal particles and their clusters at approximately their percolation threshold. The medium preferably additionally comprises a microcavity/microresonator

12. **“Microsensors for Glucose and Insulin Monitoring” (U.S. Patent #6,893,552 issued May 17, 2005.)**

Inventors: Joseph Wang, Xueji Zhang, and Fang Lu

Abstract: A dual sensor for the simultaneous amperometric monitoring of glucose and insulin, wherein the glucose probe is based on the biocatalytic action of glucose oxidase, and the insulin probe is based on the electrocatalytic activity of metal oxide. Further provided is an oxidase enzyme composite electrode with an internal oxygen-rich binder. The present invention also optionally includes metallizing components within the carbon paste to eliminate signals from interfering compounds. The present invention includes embodiments for both *in vitro* and *in vivo* uses.

13. **“Microfluidic Devices with Thick-Film Microchemical Detection” (U.S. Patent #6,878,255 B1 issued Apr. 12, 2005)**

Inventors: Joseph Wang, Baomin Tian, and Eskil Sahlin

Abstract: An apparatus for conducting a microfluidic process and analysis, including at least one elongated microfluidic channel, fluidic transport means for transport of fluids through the microfluidic channel, and a least one thick-film electrode in fluidic connection with the outlet end of the microfluidic channel. The present invention includes an integrated on-chip combination reaction, separation and thick-film electrochemical detection microsystem, for use in detection of a wide range of analytes and methods for the use thereof.

14. **“Improved Methane Generation from Waste Materials” (filed Mar. 10, 2005)**

Inventor: Zohrab A. Samani, Adrian T. Hanson, and Maritza Macias-Corral

Abstract: An organic solid waste digester for producing methane from solid waste, the digester comprising a reactor vessel for holding solid waste, a sprinkler system for distributing waste, bacteria, and nutrients over and through the solid waste, and a drainage system for capturing leachate that is then re-circulated through the sprinkler system.

15. **“Wetstacking Avoidance in Internal Combustion Engines” (Patent #6,848,419 B1 issued Feb. 1, 2005)**

Inventor: A. Burl Donaldson

Abstract: An apparatus and method for reducing or eliminating wetstacking in internal combustion engine systems operating substantially under capacity comprising establishing an

exhaust temperature minimum set point, monitoring exhaust temperature of an engine and restricting air intake into the engine when the temperature is below the set point. Intake air may also be heated when the exhaust temperature is below the set point, with the intake air divided into first and second paths, the first path being restricted and the second path being heated. The second path preferably comprises a fixed flow choke.

16. **“Full-Duplex Optical Communication System” (U.S. Patent #6,778,779 B1 issued Aug. 17, 2004.**

Inventors: Thomas M. Shay, David A. Hazzard, Stephan Horan, and Jason A. Payne

Abstract: A method of full-duplex electromagnetic communication wherein a pair of data modulation formats are selected for the forward and return data links respectively such that the forward data electro-magnetic beam serves as a carrier for the return data. A method of encoding optical information is used wherein right-hand and left-hand circular polarizations are assigned to optical information to represent binary states. An application for an earth to low earth orbit optical communications system is presented which implements the full-duplex communication and circular polarization keying modulation format.

17. **“Bismuth-Based Electrochemical Stripping Analysis” (U.S. Patent #6,682,647 issued Jan. 27, 2004)**

Inventor: Joseph Wang

Abstract: Method and apparatus for trace metal detection and analysis using bismuth-coated electrodes and electrochemical stripping analysis. Both anodic stripping voltammetry and adsorptive stripping analysis may be employed.

18. **“Optical Enhancement with Nanoparticles and Microcavities” (U.S. Patent #6,608,716 B1 issued Aug. 19, 2003)**

Inventors: Robert L. Armstrong, Vladimir M. Shalaev, Thomas A. Shay, Won-Tae Kim, Z. Charles Ying, Vladimir P. Drachev, and Vladimir P. Safonov

Abstract: A method and apparatus for enhanced optical emissions, the apparatus comprising a light source, a microcavity, and a medium comprising nanoparticles, located within or near the microcavity. The nanoparticles are either non-aggregated or are aggregated in the form of fractals. The nanoparticles and microcavity exhibit enhanced linear and non-linear optical emission. The light emitting apparatus can be used for wave-length translation, amplification, optical parametric oscillation, light detection and ranging, increased sensitivity, high density optical data storage, and near-field optical spectroscopy.

19. **“Oryzacystatin-1 Applications and Methods” (U.S. Patent #6,534,265 B1 issued Mar. 18, 2003)**

Inventors: James Womack, Jennifer Randall, and John Kemp

Abstract: A nucleic acid sequence encoding for Oryzacystatin-1 peptides and a signal peptide therefore is provided. The oryzacystatin-1 peptide is approximately 12.6 kDa, and is approximately twelve amino acid residues longer than previously described oryzacystatin-1 peptides. The nucleic acid sequences may be cloned into vectors, and used to transform plants conferring resistance to plant pests, including insects and nematodes that utilize cysteine proteases and to viruses with processing mechanisms involving cysteine proteases.

20. **“Propionate Feed Supplement” (U. S. Patent #6,525,095 B1 issued Feb. 25, 2003)**
Inventors: Mark K. Petersen, Jason E. Sawyer, Richard C. Waterman, and Dean E. Hawkins
Abstract: A supplement for ruminants comprising propionate. The propionate supplement is preferably combined with a protein feed supplement to reduce insulin insensitivity and increase body weight in ruminants.
21. **“Delivery of Nucleotides by Electrochemical Release” (U.S. Patent #6,514,762 B1 issued Feb. 4, 2003)**
Inventor: Joseph Wang
Abstract: An apparatus and method for controlled release of nucleotides from electrodes utilizing potential difference for use in delivering the nucleotide into an organism. The frequency, duration and rate of release may be specifically controlled to obtain optimal release of the nucleotide. The apparatus and method may be used in conjunction with methods for electroporation, wherein the nucleotide may transit the cell membrane and move into the cell. Alternatively, the apparatus and method may be used in conjunction with complexes of DNA and lipids or other carriers which complexes will transit the cell membrane and move into the cell. The apparatus and method may be used for gene therapy for use in treatment of any wide variety of diseases.
22. **“Free Rotator Demonstrator” (U.S. Patent #6,478,582 issued Nov. 12, 2002)**
Inventor: Harold Daw
Abstract: The free rotator device consists of a ball floated on an air-bearing surface. In operation the ball is set in rotation by hand and the path of the rotation vector is directly recorded on the spinning ball surface with a marker.
23. **“Doped Conducting Polymers Applications and Methods (U.S. Patent #6,468,785 issued Oct. 22, 2002)**
Inventors: Joseph Wang, Mian Jiang, Baidehi Mukherjee and Antonio Flores
Abstract: An apparatus for electrochemical detection of DNA hybridization utilizing oligonucleotide-containing polymer-coated electrodes and an apparatus for electrochemical detection of nucleic acids in flowing systems using doped polymer-coated electrodes. Also provided are methods for detection of DNA hybridization and for detection of nucleic acids in flowing streams.
24. **“Microfabricated Thick-Film Electrical Sensor For Nucleic Acid Determination” (U.S. Patent #6,063,259 issued May 16, 2000)**
Inventors: Joseph Wang and Xiaohua Cai
Abstract: A thick-film sensing apparatus for nucleic acid determination and testing using potentiometric stripping analysis, including two methods for nucleic acid detection at the microfabricated strips, both methods being designed for use with the thick-film sensing apparatus. The present invention is applicable for broad use in nucleic acid analysis, particularly for measurement of nucleic acids (e.g., DNA and RNA), and their sequences and interactions, and for detection of DNA damage,
25. **“Co-Expression of Proteins” (U.S. Patent #issued Nov. 23, 1999)**

Inventors: John Kemp, Suman Bagga, and Champa Sengupta-Gopalan

Abstract: The subject invention pertains to materials and methods for transformed plants and plant tissues that are capable of expressing high levels of stable proteins which are localized as protein bodies within the plant cell. Transformed plants co-expressing high levels of both the 15kD and 10 kD zein proteins are disclosed which accumulate to high levels as protein bodies in the vegetative tissue of the plant. Transformed plants co-expressing the 15 kD and 10 kD zein proteins are useful for providing forage crops containing increased levels of sulfur containing amino acids, such as methionine, in the diets of animals that normally feed on such crops.

26. **“Method of Improving Efficiency in Ruminants” (U.S. Patent #5,955,122 issued Sep. 21, 1999)**

Inventor: Mark K. Petersen\

Abstract: Disclosed are methods of altering blood constituents in grazing animals. Serum concentrations of serum insulin, serum urea nitrogen, serum glucose, and serum growth hormone in ruminants were varied by feeding specific protein supplements and an otherwise negative energy diet. Protein supplements were selected both from high rumen-degradable proteins, such as cottonseed meal, and low rumen-degradable proteins, such as blood and feather meals. Improvement in body condition and body weight was concomitant with reduced milk production.

27. **“Resin Cure Monitoring” (U.S. Patent #5,911,159 issued June 8, 1999)**

Inventors: Vincent K. Choo and Manuel V. Gomez

Abstract: Method and apparatus for monitoring curing is a resin. Acoustic, ultrasonic waves are propagated through a waveguide disposed through a quantity of resin while the resin is curing. The waves are transmitted and received by transducers arranged in an acousto-ultrasonic configuration with respect to a flexible waveguide. The waveguide may be made from bundled fibers. The velocity or amplitude of the acoustic waves is affected by the physical characteristics of the resin sample. Monitoring changes in the speed or amplitude of the propagated waves permits changes in the resin to be monitored in real time. Only a small sample quantity of resin need be employed.

28. **“Method of Improving Efficiency in Ruminants” (U.S. Patent #5,672,366 issued Sep. 30, 1997)**

Inventor: Mark K. Petersen

Abstract: Disclosed are methods of repartitioning nutrients in ruminants. Serum concentrations of serum insulin, serum urea nitrogen, serum glucose, and serum growth hormone in ruminants were varied by feeding specific protein supplements and an otherwise negative energy diet. Improvement in body condition and body weight was concomitant with reduced milk production and calf weight.

29. **“Asynchronous Temporal Neural Processing Element” (U.S. Patent #5,355,435 issued Oct. 11, 1994)**

Inventors: Mark R. DeYong, Randall L Findley, Thomas C. Eskridge, and Christopher A. Fields

Abstract: An asynchronous neural processing element. The processing element is useful in solving problems from the class of temporal signal processing problems and is modeled closely on the sub-cellular biology and electrophysiology of neurons having chemical synapses.