

Life Sciences Technologies Available for Licensing



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BIOINFORMATICS

Universal Visualization Platform (UVP)

Inventors: [Professor Georges Grinstein](#), Alexander Gee, Urska Cvek, Howard Goodell, Hongli Li, Min Yu, Jianping Zhou, Vivek Gupta, Mary Beth Smrtic, Christine Lawrence, Chih-Hung Chiang.

Docket Number UML 04-18

Case Manager: [Susu Wong](#)

Status: Patent pending and available for licensing

Summary: The Universal Visualization Platform (UVP) is a high performance data visualization and analysis platform that provides researchers with a very interactive, extensible, cross-platform data exploration environment. This powerful platform offers users the ability to visualize, manipulate and interact with millions of data in less than a minute; it is particularly useful for data manipulation for the life sciences sector. The UVP was developed by a renowned research team headed by [Professor Georges Grinstein](#) who directs the [Institute for Visualization and Perception Research](#) and [Center for Biomolecular and Medical Informatics](#), a research lab in the University's Computer Science Department.

Application: The application can be used for a variety of markets such as life sciences that utilize large statistical databases. UVP has proven to be an extremely effective application in molecular medicine and other diversified fields and has been utilized by the defense industry, as well as in financial and biomolecular applications. The UVP enables clinicians to interact with and visualize a large pool of gene expression profiles, while providing them with both standard and custom tools such as RadViz and GridViz for data manipulation. UVP can be utilized by any field that requires massive data monitoring; the markets can vary from human genome, economic, atmospheric, census data, law enforcement and many others.

System Architecture: UVP consists of a framework that provides the foundation for the development of modern integrated analysis and visualization systems. UVP is written in Java and has been tested under Windows, Linux and the Mac OS. UVP can run on a regular PC (P4 3GHz 1 Gig RAM) with at least one million records in all the visualizations and reasonable interaction (under one minute) for 10 million records. The UVP is powerful visualization software uniquely capable of processing high volume of data with multiple dimensions. The system includes user-friendly features that enable users to easily visualize and manipulate the data. Furthermore, this system can be highly customized based on the user's needs and it can be utilized by a variety of industries.

Benefits: UVP helps your customers to accelerate their decision making process by providing faster and visually interactive data; faster decision making means reduced development time and cost.

BIO-CHEMISTRY

Polymeric Electrolytes

Inventors: [Arthur Watterson](#), [Rajesh Kumar](#), Virinder Singh Parmar, [Jayant Kumar](#), [Lynne Samuelson](#) and Ferdinando Bruno

Docket Number UML 04-14

Case Manager: [Susu Wong](#)

Status: Patent pending and available for licensing

Summary: This is a new class of polymers which find application in market sectors ranging from energy sources to biomedical applications. The technology is a method to synthesize amorphous polymers whose main chains are comprised of both aromatic and aliphatic units (with repeating heteroatoms) and macromonomer side chains. Alternative methods include synthesizing these polymers enzymatically. These polymers have high segmental mobility due to their free volume while maintaining good mechanical properties, resulting in very high ionic conductivity in polymer-ion complexes.

Applications: The polymers and compositions are useful for opto-electronic applications, such as polyelectrolytes in photovoltaic solar cell devices and biosensor applications. They can also be deployed for dye-sensitized solar cell (DSSC)-devices based on molecular dyes for development of small, lightweight, powerful, safe, environmentally benign, and portable energy sources. These polymers can be used in batteries or solar cells that are small, light, and easy to manufacture, and contain little or no toxic compounds.

High levels of biocompatibility make these polymers good candidates for biomedical applications. For example, they can be used as biodegradable matrices for tissue engineering. These polymers can also be used to deliver therapeutic agents, including genetic and non-genetic therapeutic agents or cells. Therapeutic agents can be administered and delivered by the system singularly or as a combination with other agents. Furthermore, the therapeutic agents can be nonionic, anionic and/or cationic in nature. The amphiphilic nature of these polymers allow them to fold into specific conformations, e.g., to form micelles in aqueous solutions. Thus, they can be used to encapsulate drugs - anticancer, antibiotic, antiviral, and related drug molecules, in aqueous media.

Benefits: These polymer systems are inexpensive and environmentally stable. The polymers have greater stability (thermal and mechanical) compared to polymer electrolytes synthesized from starting material having acidic functional groups (e.g., carboxylic acid).

BIO-MATERIALS

Synthesis of Novel Functionalized Polyesters by Enzymatic Catalysis

Inventors: [Arthur Watterson](#), [Rajesh Kumar](#), [Virinder Singh Parmar](#), [Jayant Kumar](#), [Lynne Samuelson](#)

Docket Number UML 02-18

Case Manager: [Susu Wong](#)

Status: US Patent 6,962,963 issued and available for licensing

Summary: The invention is an exciting new class of flame retardant materials that have the potential to meet or exceed the flame protection properties of current materials. Using a novel biocatalytic method, these environmentally and human-safe novel materials are expected to have wide use in military and commercial applications such as in coatings, blends, and composites. They represent a significant breakthrough in fire retardant materials. This patented methodology and material uses enzymes (lipase, esterase, or protease) as catalysts to synthesize a new class of polysiloxane materials for flame retardant materials.

Applications: These polymers can be used in a variety of different applications including a number of biomedical applications such as controlled drug delivery, tissue engineering, flame retardant material, bio-implants and scaffolds.

Benefits: The combustion products of these polymers are benign, non-toxic, cyclic silicons rather than the typical toxic halogenated combustion products of current flame retardants. This enzymatic synthesis is a “green” chemistry without the use of toxic solvents. Polysiloxanes consist of low heat release capacity which is one mechanism for their flame retardancy. In addition, the synthesis does not involve metal oxides which are commonly used as flame retardant additives that require heavy loading and therefore alters the properties of the material. It is halogen-free and meets European standards because no toxic fumes are released upon burning, and no hazardous chemicals leach into environment. The great flexibility of these polymers, their ease of processing, their low cost, and their nontoxic nature present an attractive alternative solution over current technologies.

Polymer-Protein Substrates for Immunosorbent Fluorescence Assays

Inventors: Drs. [Melisenda McDonald](#), [Joey Mead](#) and Lisa Clarizia

Docket Number UML 07-06

Case Manager: [Susu Wong](#)

Status: Patent Pending and available for licensing

Summary: The invention is an innovative novel polymer-protein substrate designed for immunofluorescent assays. This novel system yields a five-times increase in sensitivity over traditional polystyrene assay plates. We believe this system will allow detection of test articles at

significantly lower concentrations than current high performance assays and will lead to significant improvement in inter- and intra-assay variability. Additionally, the advantage of this system is the capability of aligning capture antibodies while retaining their biological function, making it an ideal application for use in small-volume and miniaturized assays. This system uses a combination of polymer substrate and a specific kind of protein; both of them utilize commonly available and inexpensive materials.

Application: This technology can be integrated into current immunoassay products without major modifications to existing processes: ELISA, FLISA, EIA, Specialized kits for detecting specific biomarkers and miniaturized assays

Benefits: This team of cross-discipline researchers has developed a new method and material for use in immunological assay test plates that significantly increases sensitivity while dramatically amplifying signal. Our system demonstrates a 5-fold increase over the current industry standard of High Performance assays, thus lowering the limit of detection for biomarkers (disease indicators) below present thresholds. Early detection of diseases at very low levels of biomarkers could provide life-saving indication such as high-mortality carcinomas. This technology can be incorporated into existing assays process with minimal modification or revamping a new process. The matrix can be used with lower concentration of antibody and still exhibit higher sensitivity than currently available matrix.

Polylactic Acid-Based Blends

Inventors: [Dr. Stephen McCarthy](#), Wenguang Ma, Richard A. Gross

Docket Number UML 97-12

Case Manager: Paul E. Fredette

Status: Patent 5,883,199 issued and available for licensing on a non-exclusive basis

Summary: Dr. Stephen McCarthy and his [research lab](#) have developed and patented a methodology for processing PLA (polylactic acid-based polymers) that enables applications for which toughness and ductility are important features. Biodegradable blends of a polylactic acid-based polymer with other polymers can be formulated to optimize a property of interest; for example, tensile strength, ultimate elongation, or rate of biodegradation.

Applications: This invention is useful for applications such as biodegradable packaging for compostable waste materials, biodegradable flatware for fast food establishments, encapsulation of pharmaceuticals for controlled drug release, and biodegradable implantable bone plates and fasteners.

Benefits: This technology is biodegradable and can be optimized for various commercial applications.

CELL CULTURES AND SENSORS

Cell NANI (Novel Automated Nutrient Incorporation)

Inventors: Dr. Xingwei Wang, Dr. Emmanuelle Reynaud, Dr. Daniel Schmidt, Dr. Lisa-Jo Clarizia, Dr. Melisenda J. McDonald

Docket Number UML 07-22

Case Manager: [Susu Wong](#)

Status: Patent Pending and available for licensing

Summary: A new range of robust, biocompatible polymer capable of pH regulation and pH sensitive delivery of key culture nutrients to eukaryotic cell lines has been developed. The Cell NANI can deliver glucose, control pH, and enhance the viability of mammalian cells without human intervention. In addition, a complementary low-cost, on-line, non-invasive optical system has been developed for monitoring pH change, cell growth and cell viability in conjunction with our delivery system. The objective of this multidisciplinary research effort is to develop a non-invasive, real-time method for replenishing key cell culture media components by incorporating these components into novel polymer that will release the desired compounds in response to changes in the pH of the culture. In this way the feeding process is automatic, cell-driven, and requires no human intervention.

Applications: This technology can be commercialized in the biotechnology and pharmaceutical sectors, and would be of significant interest to any company or labs that involved in the labor-intensive culturing of cells (mammalian in particular) as a means of research, development, or production of cell lines (i.e. stem cells), substances (i.e. therapeutic or bioactive agents), materials (i.e. biopolymers), systems (i.e. biotreatment / biofiltration) or medical devices.

Benefits: This technology offers many benefits and improvements over current automated cell culturing methods. This polymer is a low cost solution system consists of inexpensive, commercially available components and can be manufactured rapidly. This technology is a good low-cost alternative solution for small to medium-sized labs. It requires minimal human intervention and reduces the chances of contamination as well as cell distress or death from nutrient depletion or suboptimal conditions. This system also provides faster target time, speeds the growth of cells and reduces cell deaths due to suboptimal conditions; this represents a potential enabling technology that may allow scientists to accelerate their studies and companies to move faster to market.

MEDICAL DEVICES AND IMAGING

Infrared Scanner for Biological Applications

Inventors: [Dr. Samson Mil'shtein](#) and [Niyom Lue](#)

Docket Number UML 04-21

Case Manager: [Paul E. Fredette](#)

Status: Patent pending and available for licensing

Summary: Device and know-how for real-time continuous scanning of bones, tendons and other biological objects with breakthrough clarity and definition, using inherently safe infrared as the light source. When subjects such as an arm or fingers are scanned, the images reveal the underlying tissues: tendons, muscles, ligaments, blood vessels, bones and cartilages are visible with this device and cannot be detected on an X-ray or with other infrared devices. The device operates simultaneously with a wide band of infrared wavelengths which are detected in the transmission mode by low noise near-infrared camera.

Applications: Broken bone detection and repair allowing the physician to see the attachment of broken parts in real time and in-situ; identification of tendons during diagnosis and surgery; tumor identification and location. In short, most objects that can be seen via X-Ray, MRI and other sophisticated technologies can now be seen with safer and continuous infrared imaging.

Benefits: This technology provides a safe and low cost real-time video versus mere static images.

Selective Whole Cell Quartz Crystal Microbalance Biosensors

Inventors: Drs. [Kenneth Marx](#), [Susan Braunhut](#), Tiesan Zhou and Anne Montrone

Docket Number UML 02-24

Case Manager: [Susu Wong](#)

Status: Patent Pending and available for licensing

Summary: The quartz crystal microbalance (QCM) is a device capable of assaying and characterizing nanogram masses. Using this device, materials as well as a protocol have been developed to assay living biopsy cells that result in the diagnosis of malignancy, as well as quantifying the efficacy of various chemotherapies against malignant biopsy cells. The QCM has excellent repeatability for characterization of cells, using changes in the crystal oscillation frequency and variation in motional resistance.

Applications: The invention may be used to test the efficacy of therapies on cancerous cells, with the potential for nearly immediate feedback to provide optimum therapy on an individual basis. The technology has the capability to definitively diagnosis suspect tissue for malignancy in rapid response

time. Applications include benchtop comparison of therapeutic treatments and bench top evaluation of new therapeutics for drug discovery.

Benefits: This patent pending invention has shown to be useful for diagnosis of biopsies, using as little as 2% of a typical needle biopsy. The measurement will provide clear indication of the type of malignancy or determine if the sample is benign. The complete turnaround time is a maximum of 24 hours, and strong indications are found as quickly as 6 hours. This would be extremely valuable in shortening treatment time and beneficial for drug evaluation and discovery.

Polymeric Antioxidants

Inventors: Drs. [Ashok Cholli](#), Vijayendra Kumar, Jayant Kumar, Virinder S Parmar, [Lynne Samuelson](#), [Ferdinando F. Bruno](#)

Docket Number UML 02-17

Case Manager: [Paul E. Fredette](#)

Status: Patent pending and available for licensing

Summary: Antioxidants play an important role in the preservation of many of the products society consumes on a daily basis. These preservatives are commonly used in foods containing significant unsaturated lipids and unsaturated fatty acids. While the usage of antioxidants is advantageous and necessary, the quantities added to foods are limited due to the potential harm they may cause to humans and animals alike. Fat is indigestible, cannot be absorbed by human beings, and is generally unhealthy. These polymeric antioxidants prevent harmful side-effects from fat even if it is digested. This invention is a new class of industrial antioxidants to protect a wide range of materials from thermo-oxidative degradation processes thereby extending the shelf life of products.

Applications: This technology is beneficial to manufacturing companies from the plastics, lubricants, fuel, processed foods and oils industries.

Benefits: This patented technology is eco-friendly and relatively inexpensive for manufacturing in a high volume capacity. The antioxidant properties of these novel polymers are five times more potent than their counterpart small molecules. A key advantage over currently available antioxidants (monomers) lies in the fact that these newly synthesized polymer structures have repeating units of small antioxidant molecules with enhanced antioxidant activities. These antioxidant molecules help to extend the shelf life of a number of different products by deferring the oxidative degradation activities.

Anti-Oxidant Synergy Formulation Nanoemulsions to Treat Cancer

Inventors: Drs. [Robert Nicolosi](#) and [Thomas Shea](#)

Docket Number UML 05-17

Case Manager: [Paul E. Fredette](#)

Status: Patent pending and available for licensing

Summary: This invention utilizes nanoemulsions as a mechanism for delivering therapeutic formulations for the treatment of cancerous tumors. An antioxidant synergy formulation has been developed (ASF) which efficiently prevents the proliferation of cancerous cells in cell cultures and encourages cell differentiation. Tests performed show that the nanoemulsion encapsulated ASF significantly reduces tumorous cell growth.

Applications: There is significant demand for drug formulations that can be efficiently delivered to treat cancerous cells. Neuroblastoma is one of the most common solid tumors of early childhood; it usually originates in the adrenal medulla and common growth sites are the chest, neck and pelvis. Further development of this procedure can lead to novel approaches towards the suppression of clinical neuroblastoma.

Benefits: ASF contains vitamin E which is a known neurotoxicity reducer and prevents proliferation of neuroblastoma in cell cultures. Encapsulated ASF preparations proved to be 60% more efficient in reducing tumorous cell growth than other delivery methods. The growth of tumors was reduced by 77% when treated transdermally with nanoemulsion encapsulated ASF cream.

Synthesis of Oligo/Poly (Catechins) and Methods of Use

Inventors: Drs. [Jayant Kumar](#), [Susan Braunhut](#), [Lynne Samuelson](#), Ferdinando F. Bruno, Subhalakshmi Nagarajan, Ramaswamy Nagarajan, Klaudia Gorski and Donna McIntosh

Docket Number UML 05-12

Case Manager: [Susu Wong](#)

Status: Patent Pending

Summary: Recent studies have reported that green tea and its constituents have been used in the treatment and prevention of breast, colon, stomach and lung cancers. Scientists believe that epigallocatechin gallate (EGCG) found in green tea exhibits chemo-preventive activity against cancer, but EGCG's anticancer properties are hindered due to its insolubility and instability. Our researchers have developed environmentally benign techniques to modify an active component of green tea that makes it remarkably effective against cancer cells. The break through is the use of naturally occurring enzymes to "stitch together" green tea catechins yielding polycatechins that are very effective in treating against breast cancer.

Applications: Improvements as anti-cancer medical treatments over current, water-insoluble, anti-cancer drugs.

Benefits: The polymers process greater anti-cancer activity over the naturally occurring monomers, and the water-soluble catechins are more stable and can simplify the synthesis process. The flavonoids in these polymer complexes can be applied in a wide range of medical applications.

MEDICAL IMAGING & SENSORS

Loose Alignment Scanner for Biometric Application

Inventors: Drs. [Samson Mil'shtein](#) and [Joel Therrien](#)

Docket Number UML 00-17

Case Manager: [Paul E. Fredette](#)

Status: Patent 6,961,449 issued and available for licensing

Summary: A method and apparatus for improved matching of an acquired image to a reference image, as would be used in fingerprint matching to identify a person. In particular, the method is used to compare images of a biometric object to authorize an individual or verify whether an individual is the person they claim to be. The biometric objects may include fingerprints, hand or palm prints, and retina scans. The method uses a "deviation of symmetry of correlation" function to determine whether the images are of a same object. The problem with conventional image correlation techniques is that they are typically performed using fast Fourier transforms, image shifting, or optical transformation techniques. These techniques require extensive processing of the images in hardware or software and the computational load increases significantly as the image resolution increases.

Applications: This type of technology can be applicable for government and law enforcement purposes. Companies that manufacture biometric equipment will find "deviation of symmetry" as a parameter for judgment in correlation technique efficient and useful in finger and palm recognition procedures. Firearm and security systems manufacturers may also find this type of procedure useful for their respective applications.

Benefits: Any optical image may carry a significant amount of noise; this procedure reduces noise due to the way the functions are constructed. The correlation procedure doesn't require massive computational power or a sophisticated process. Instead it uses much simpler devices, such as memory shifters.

THERAPEUTICS/DRUGS

Formulations for Reducing Neuronal Degeneration

Inventors: Drs. [Tom Shea](#), Eugene Rogers and Robert Nicolosi

Docket Numbers UML 01-14 and 08-04

Case Manager: [Susu Wong](#)

Status: Patent Pending

Summary: This exciting research is an inexpensive, patent-pending, over-the-counter proprietary formulation consisting entirely of vitamins and nutraceuticals. All of the ingredients are safe, available over-the-counter, and have been individually tested with mild to moderate efficacy. The unique combination of these compounds provides synergistic protection of brain cells, preventing both the loss of cognitive performance that accompanies Alzheimer's disease, and even boosting cognitive power in healthy seniors without any symptoms of dementia. Clinical trials have demonstrated the efficacy in preventing cognitive decline in aging, and even shown improvement in both long term and short memory of healthy adults with no signs of Alzheimer's disease.

Applications: Nutraceuticals for treatment of neuronal diseases, such as ALS, Alzheimer's disease, and memory improvement.

Benefits: The novelty with this application is due to the formulation of ingredients that enable natural synthesis of antioxidants in our bodies which creates an energy boost for brain cells; and a compound that, shown by Shea and colleagues, unlocks the power of antioxidants.

CONTACT INFORMATION

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