



Electronics, Software and Devices Technologies Available for Licensing

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Electronics Coatings

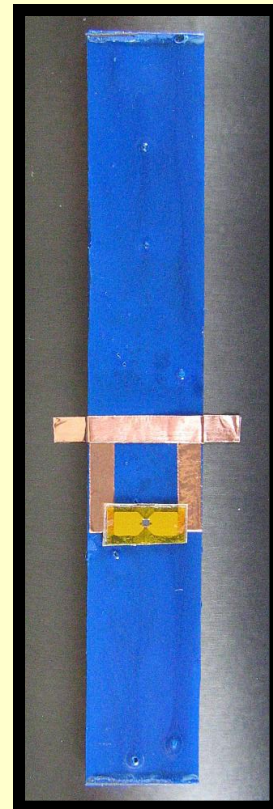
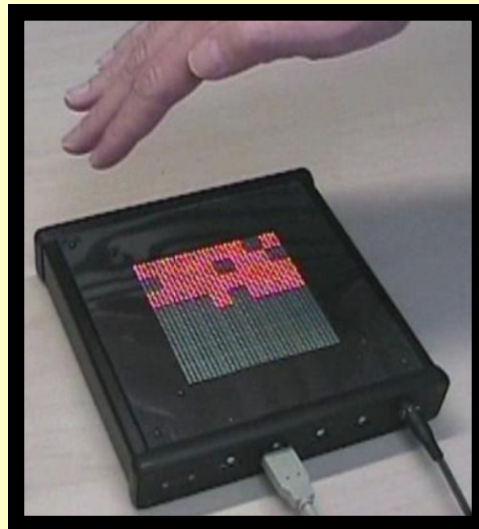
Software & Algorithms

Mechanical Innovations



NDSU/RF uses the term "Green" to refer to a technology that results in a positive impact, to any degree, on the environment.

Electronics







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Devices


Technologies by Application


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RFT-152/153		Novel Radiation-Curable Polymer Film and Radiation-Curable Sensitizers having Improved Laser Ablation Properties
RFT-108		Single-layer Functional Nanoparticles with Metal Core
RFT-65		A Method of Using Organometallic Single Source Precursors to Make Aluminum Oxide and Other Inorganic Coatings
RFT-46		Novel Multi-Frequency Quadrature Signal Correction Method
RFT-44		On-The-Go Sensor Reads Sugar Content During Harvest
RT-39		Advances in the Deposition of Amorphous Silicon Films and Printed, Flexible Electronic Circuits
RFT-30		Optical Sensor for Analyzing a Stream of an Agricultural Product to Determine its Constituents

Technologies by Application

Tech No.	Coatings for Electronics
RFT-378	 Flame Retardant Brominated Polymer with High Refractive Index
RFT-373	 Polymer Coatings of Polypyrrole with Conducting Properties
RFT-356	 Anti-Reflective Coating Process Offers 50% Reduction in Process Cost and Equipment
RFT-351	 Template-Free Aqueous Synthesis Of Polypyrrole Nanospheres
RFT-182	Conductive Ink Compositions
RFT-178	Novel "Carrier Gas" Sensitizers for Improved Laser Ablation Performance of Coating Films
RFT-152/153	Novel Radiation-Curable Polymer Film and Radiation-Curable Sensitizers having Improved Laser Ablation Properties

Tech No.	Software and Algorithms
RFT-281	Web-based Software Suite for the Management and Operation of Laboratory Equipment
RFT-256	Asynchronous Cellular Automation Provides Benefits Over Field-programmable Gate Arrays
RFT-79/99	Portfolio of Technologies Related to Database Concurrency Control
RFT-46	Novel Multi-Frequency Quadrature Signal Correction Method

Tech No.	Mechanical Innovations
RFT-370	 Contactless Laser-Assisted Placement of Discrete Electronic Components
RFT-280	New Test Device Provides Highly Accurate Measurements of Swelling Soil Characteristics
RFT-223	Collimated Aerosol Beam Assembly Delivers Printed Lines Under 5 Microns

Tech No.	 Green Technologies
RFT-311/311A	Unique Electrospinning Process and Compositions for High Volume Silicon Nanowire Production
RFT-223	Collimated Aerosol Beam Assembly Delivers Printed Lines Under 5 Microns
RFT-166	Environmentally Safe Device for Detection of Explosives and Hazardous Chemicals
RFT-161	Chromophore and Polymer Capable of Detecting the Presence of Various Neurotoxins




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Tech. No.	Technology Title	Category(ies)
RFT-378	<p>Flame Retardant Brominated Polymer with High Refractive Index</p> <p>This invention consists of a method of creating a highly brominated polyvinylether that has essentially the same bromine content as PBrBA, but with an extremely high aromatic bromine content which makes it useful as a flame retardant for plastics. In addition, it has a high refractive index which is beneficial in many optical applications. This flame retardant plastic can be used in electronics, including printed circuit boards, connectors, plastic covers, and cables as well as in automobiles, aircraft, building and construction materials, furniture, upholstery fabrics, carpets and kitchen appliances.</p>	<p>Electronics/ Sensors Coatings</p>
RFT-375	<p>Antenna-less RFID Tags Enable Use on Metal and Liquid-Filled Containers</p> <p>The invention is a low-profile, high-permeability antenna-less RFID tag for use on large metal objects and other objects for which traditional RFID technologies will not work. The approach is to incorporate high-permeability materials in the tag to create an impedance across a metal surface, such as a metal container, diverting current into the tag's integrated circuit (IC). This type of tag is essentially 'antenna-less' as it uses the ground plane (the metal surface on which it is mounted) to excite currents through the IC. Tags using high-permeability materials in this manner are significantly thinner than those developed using other methods.</p>	<p>Electronics/ Sensors</p>
RFT-373	<p>Polymer Coatings of Polypyrrole with Conducting Properties</p> <p>This is a novel method for preparation of polypyrrole coatings for various electronic applications such as printing circuit boards and conductive inks in order to improve binding properties and adhesion of coating with optimized conductivity onto various substrates. The polypyrrole conductive coating can be prepared via simultaneous photopolymerization of pyrrole and UV curable acrylate monomer in a simpler manner than other traditional methods.</p>	<p>Electronics/ Sensors Coatings</p>
RFT-370	<p>Contactless Laser-Assisted Placement of Discrete Electronic Components</p> <p>This is a method for the contactless laser-assisted assembly of discrete components such as ultra-thin, ultra-small semiconductor dies and MEMS components onto rigid and flexible substrates. Laser-direct write techniques are an enabling technology for the ever-decreasing scale of microelectronic devices. Specifically, Laser Induced Forward Transfer (LIFT) techniques show promise as a disruptive technology which will enable the placement of components smaller than what conventional pick-and-place techniques are capable of today. NDSU's Thermo-Mechanical Selective Laser Assisted Die Transfer (tmSLADT) process is an application of the unique blistering behavior of polyimide film when irradiated by low energy focused ultraviolet laser pulses. The tmSLADT process has the potential to take its place as the next generation LIFT technique, with distinct advantages over previously studied ablative and thermal releasing techniques. Experimental results studying transfer precision indicate this non-optimized die transfer process compares with, and may exceed, the placement precision of current assembly techniques.</p>	<p>Electronics/ Sensors Mechanical Innovation</p>
RFT-356	<p>Anti-Reflective Coating Process Offers 50% Reduction in Process Cost and Equipment</p> <p>Amorphous thin films of silicon-based materials such as silicon nitride, silicon carbide, and silicon carbonitride, among others, are often used as protective coatings, dielectric gate layers in microelectronics, and optical coatings such as anti-reflection coatings in solar cells. Typical existing processes for synthesizing and depositing these coatings utilize hazardous chemicals such as silane, ammonia, and methane, and must be produced in an expensive batch process using large, expensive capital equipment. Researchers at North Dakota State University (NDSU) have developed a new process for depositing anti-reflective conformal coatings that is compatible with roll-to-roll manufacturing processes, utilizes off-the-shelf equipment, and significantly reduces the use of hazardous materials.</p>	<p>Electronics/ Sensors Coatings</p>

Tech. No.	Technology Title	Category(ies)
RFT-351	<p>Template-Free Aqueous Synthesis Of Polypyrrole Nanospheres</p> <p>This synthesis procedure utilizes ozone as an oxidant in the polymerization of pyrrole to produce polypyrrole nanospheres. The key inventive concept is that there are no template materials involved in the synthesis process and that this reaction is carried out in water at room temperature. The ozone reacts very quickly meaning that there should not be residues left behind in the nanospheres that would be harmful to humans or the environment. The reaction produces well defined, nanosized, spheres of polypyrrole with a narrow particle size distribution.</p>	<p>Electronics/ Sensors Coatings</p>
RFT-344	<p>Organometallic Materials with Unique Optical Properties</p> <p>This invention revolves around platinum terdentate and bidentate complexes designed, characterized, and synthesized by the inventors. These complexes exhibit broad and strong reverse saturable absorption and/or two-photon absorption in the visible and the near-IR region with excellent solubility in organic solvents.</p> <p>They also exhibit high-efficiency emission at room temperature. The color and/or the emission of the complexes could change upon physical (temperature) or chemical (pH values, anions, cations, volatile organic vapors, etc.) stimuli. The novelty in this invention is the introduction of substituted fluorenyl unit to the platinum complexes in order to increase the emission efficiency, adjust the solubility, and enhance the two-photon absorption in the near-IR region.</p>	<p>Electronics/ Sensors</p>
RFT-336	<p>Micro Cold Spray Enables Fine Features without the Heat</p> <p>Scientists working at NDSU have designed a novel cold spray tool and process that is able to direct write metallic lines using metallic powder precursors in small, well defined areas. This can be done at high deposition rates with features as small as 10 microns possible.</p>	<p>Electronics/ Sensors</p>
<p>RFT-311/ 311A</p> 	<p>Unique Electrospinning Process and Compositions for High Volume Silicon Nanowire Production</p> <p>This is a unique synthetic route to a novel liquid silicon precursor, cyclohexasilane (Si₆H₁₂), which is converted to silicon nanowires by electrospinning. Readily purified by distillation, the liquid nature of Si₆H₁₂ allows the development of a high-volume electrospinning route for silicon nanowire production. Because the spun wires convert to amorphous silicon at relatively low temperatures, formation of excessive surface oxide and carbide phases can be avoided which would otherwise negatively affect capacity and rate capabilities. The technology can be used in the development of anodes for use in next-generation lithium ion batteries, in which the traditional carbon-based anode is replaced with a silicon-based anode for a dramatic increase in capacity (theoretically over 1100% increase in capacity).</p>	<p>Electronics/ Sensors</p>
RFT-299	<p>Improved Electrical Properties of Boron-rich Films for Semiconductors Devices</p> <p>Scientists working at North Dakota State University's Center for Nanoscale Science and Engineering (CNSE) have developed novel processing conditions necessary for enhancing the charge collection and transport efficiency of p-type boron-rich semiconducting solids by an order-of-magnitude over the prior art. The advances made in the processing of the boron-carbide materials enable the enhancement of radiation-hardened semiconducting materials that can be used in applications where traditional semiconductors would fail.</p>	<p>Electronics/ Sensors</p>





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Tech. No.	Technology Title	Category(ies)
RFT-295	<p>Extensible Light-sensing LED Array</p> <p>This NDSU-developed technology describes the use of an extensible array of light-emitting diodes (LEDs) as a means of sensing incident light levels. This light-sensing LED array can be used to construct highly-dynamic backlights for displays and large-format synthetic aperture cameras.</p>	Electronics/ Sensors
RFT-281	<p>Web-based Software Suite for the Management and Operation of Laboratory Equipment</p> <p>This NDSU invention is a web-based suite of software tools designed to help with the management and operation of advanced laboratories and laboratory equipment. Software features include the scheduling and tracking of lab equipment and instrumentation, providing built-in security functions, and the generation of periodic reports and financial records.</p>	Software/ Algorithms
RFT-280	<p>New Test Device Provides Highly Accurate Measurements of Swelling Soil Characteristics</p> <p>There are primarily two types of test devices used for measuring hydraulic flow characteristics in soils in the lab setting: rigid-wall permeameters and flexible-wall permeameters. Unfortunately, neither type of device performs well with swelling soils such as clays. A swelling soil sample in a rigid-wall device can shrink and allow fluid to seep around the sample instead of through it. A swelling soil sample in a flexible-wall device can bulge, changing the volume, surface area, and even the microstructure of the sample. The present invention addresses these problems and disadvantages by combining the best features of both types of permeameters, producing soil sample measurements with increased accuracy.</p>	Electronic/ Sensors Mechanical In- novations
RFT-256	<p>Asynchronous Cellular Automation Provides Benefits Over Field-programmable Gate Arrays</p> <p>North Dakota State University scientists have created a unique asynchronous cellular automaton which is believed to have several distinct advantages over currently available field-programmable gate arrays (FPGAs). These cellular automata are easily scaled from small circuits to large computing arrays.</p>	Electronic/ Sensors Software/ Algorithms
 RFT-223	<p>Collimated Aerosol Beam Assembly Delivers Printed Lines Under 5 Microns</p> <p>Scientists at North Dakota State University have developed a micro-capillary system capable of generating a collimated aerosol beam (CAB) in which aerosol particles stay very close to the capillary center line. This novel CAB nozzle allows for aerosol beams with consistent diameters as thin as 1 micron, and printed lines of less than 5 microns! The CAB nozzle works on the premise of connecting three micro-capillaries in series: a linearly <i>converging</i> micro-capillary (MC1), followed by a linearly <i>diverging</i> micro-capillary (MC2), followed by another linearly <i>converging</i> micro-capillary (MC3). This arrangement produces maximum particle focus by the time the aerosol beam exits the third micro-capillary.</p>	Electronic/ Sensors Mechanical In- novations



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Tech. No.	Technology Title	Category(ies)
RFT-182	<p>Conductive Ink Compositions</p> <p>Environmental regulations are putting pressure on the use of solvent-borne inks and, thus, alternatives that do not emit hazardous air pollutants are sought. Ultraviolet (UV) curable polymer technology is a viable alternative, since these inks are liquid at application conditions, generally contain no organic solvent, and are converted into a hard, tack-free ink quickly using UV light.</p> <p>Scientists working at NDSU have discovered a method to make conductive ink compositions that harden to conductive, tack-free, thermoplastic materials upon polymerization by radiation and/or heat.</p>	<p>Electronic/ Sensors Coatings</p>
RFT-178	<p>Novel "Carrier Gas" Sensitizers for Improved Laser Ablation Performance of Coating Films</p> <p>Laser ablation of polymeric materials results in more precise patterning and improved performance when the polymeric material decomposes into a gas capable of carrying ablation material away (carrier gas). NDSU inventors have developed polymer films and additives that can be used in polymer films such as polyol photosensitizers, carrier gas UV laser ablation sensitizers and other additives that can be used in preparation of such carrier films.</p>	<p>Electronics/ Sensors Coatings</p>
 RFT-166	<p>Environmentally Safe Device for Detection of Explosives and Hazardous Chemicals</p> <p>Scientists at North Dakota State University have developed a unique, cost-effective, and environmentally friendly security detection device that is capable of identifying a wide array of explosives, toxic products, pollutants, and hazardous materials. Building upon the concept of Ion Mobility Spectrometry (IMS) screening technology, this device has improved sensitivity and can monitor samples in ambient air. The improved sensitivity also allows the device to reduce the number of false positive alerts. Simplified electronic components and the use of a photo-emissive source instead of a radioactive source allow units to be manufactured as a lower cost and without hazardous components</p>	<p>Electronics/ Sensors</p>
 RFT-161	<p>Chromophore and Polymer Capable of Detecting the Presence of Various Neurotoxins</p> <p>This NDSU-developed invention is a dual-use technology that was initially reported under the spin electronics program funded by Department of Defense. The "spintronics" polymer is being tested for use in applications such as increased electronic or computer memory. However, this same material was also used by NDSU in sensor tests. The material provides an optical alert when it comes in contact with metallic poison such as insecticides that are in the same family as nerve gas and neurotoxins.</p>	<p>Electronics/ Sensors</p>
RFT-152/153	<p>Novel Radiation-Curable Polymer Film and Radiation-Curable Sensitizers having Improved Laser Ablation Properties</p> <p>These inventions pertain to unsaturated polyester polymer compositions containing monomer molecules that sensitize the resulting polymer coating/film to ablation (i.e., removal of film material) by exposure to laser radiation (and method for making same). This technology is of potential value to parties in the semi-conductor and electronic manufacturing industries.</p>	<p>Electronics/ Sensors Coatings</p>



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Tech. No.	Technology Title	Category(ies)
RFT-108	<p>Single-layer Functional Nanoparticles with Metal Core</p> <p>The technology provides for production of a single nanoparticle core bonded to a single functional moiety in isolation from other nanoparticles as well as collections and combinations of such nanoparticles, e.g., 2 or more of such nanoparticles.</p>	<p>Electronics/ Sensors</p>
RFT-79/99	<p>Portfolio of Technologies Related to Database Concurrency Control</p> <p>This invention comprises a Read-commit Order Concurrency Control method for centralized database systems (ROCC). ROCC is a deadlock-free concurrency control method based on optimistic mechanisms. It maintains a Read-Commit queue (RC-queue) that records the access order of transactions. Along with the RC-queue, an intervening validation method is developed and used for execution validation. In addition to traditional operation conflict, the new concept of element conflict is introduced and used. Through the intervening element conflict check, the transaction restarts and validation complexity are reduced.</p>	<p>Software/ Algorithms</p>
RFT-65	<p>A Method of Using Organometallic Single Source Precursors to Make Aluminum Oxide or Other Inorganic Coatings</p> <p>A new family of organometallic compounds has been developed by NDSU Scientists. These compounds contain a metal such as aluminum and a group 16 element such as oxygen in a stoichiometric ratio of 2:3 and can be decomposed to produce an inorganic compound such as A12O3 (aluminum oxide), eliminating the organic portion of the original compound. Aluminum oxide is the only material developed to date under this program, although it may be expanded to other very useful compounds. This technology has completed initial laboratory testing. Scale-up is required, but no difficulties are foreseen.</p>	<p>Electronics/ Sensors</p>
RFT-46	<p>Novel Multi-Frequency Quadrature Signal Correction Method</p> <p>The multi-frequency system enables a signal processing system to determine vector mismatches between numerous signal paths. By broadcasting a multi-tone, multi-frequency calibration signal and comparing it to an ideal waveform mathematically generated in the receiver, the method can detect mismatches across multiple frequencies, distinguishing it from conventional mismatch determination systems. Periodic calibration signals are used to adapt the system performance dynamically, allowing the correction of time-varying mismatch errors. This multi-frequency detection and correction improves signal quality and reliability, and includes assessments of in-phase and quadrature signal paths, as well as vector mismatch between array elements. The system includes the capability of test signal injection at the RF (Radio Frequency) stage, which allows the detection and correction of mismatch in RF-to-IF (Intermediate Frequency) components.</p>	<p>Electronics/ Sensors</p> <p>Software/ Algorithms</p>
RFT-44	<p>On-the-Go Sensor Reads Sugar Content During Harvest</p> <p>This invention provides a fast, reliable and nondestructive method of determining sugar content during the harvest of sugar beets. This on-the-go sugar content sensor, developed at North Dakota State University, uses optical technology in combination with intelligent information processing techniques to provide sugar content information in real time as the sugar beets are being harvested. By combining the sugar data with the yield information, the producer has unprecedented, site-specific accuracy.</p>	<p>Electronics/ Sensors</p>

Tech. No.	Technology Title	Category(ies)
RFT-39	<p>Advances in the Deposition of Amorphous Silicon Films and Printed, Flexible Electronic Circuits</p> <p>This patented technology provides a compound and process useful in the production of amorphous silicon films, such as those used in photovoltaic applications, as well as in the creation of printed, flexible electronic circuits. The technology involves a process of producing compounds containing a tetradecachlorocyclohexasilane dianion. These compounds are prepared by contacting trichlorosilane with a reagent composition comprising a tertiary polyamine. The resulting dianion can be chemically reduced to liquid cyclohexasilane (CHS), a stable compound useful in the silicon-based industries described herein.</p>	Electronics/ Sensors
RFT-30	<p>Optical Sensor for Analyzing a Stream of An Agricultural Product to Determine its Constituents</p> <p>An optical sensor for use in measuring constituents of an agricultural product. An optical sensing window passes a stream of the agricultural product, and a radiation source irradiates the stream as it passes through the optical sensing window. A receiver receives radiation transmitted through the stream and converts it into a corresponding electrical signal using a spectrometer. The electrical signal is digitized to produce a series of data points corresponding to particular wavelengths. A processor normalizes the data points using a reference value in order to generate processed data points that can be used to predict a constituent content of the agricultural product.</p>	Electronics/ Sensors



For Further Information visit our website:

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