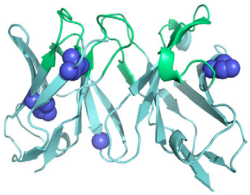
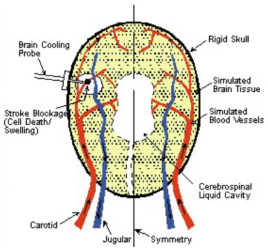
Available Technologies from Argonne National Laboratory



Antibody Engineering Strategy Improves Stability

Patent Application: WO2011/008690 A1 (ANL-IN-08-030)

Addressing the global demand for antibody therapeutics, Argonne has developed a cost-effective engineering strategy for improving the stability of antibodies and antibody fragments. The strategy is novel as it targets a small number of amino acid residues in antibody variable domains.



Brain Cooling Probe Offers Improved Treatment for Brain Trauma

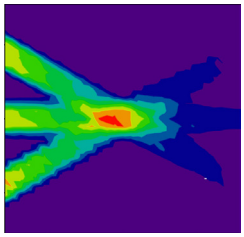
U.S. Patent 7,118,591 (ANL-IN-02-043)

Argonne's brain cooling probe and coolant supply system allow targeted protective cooling in cases of brain injury caused by stroke or other head trauma. Such injuries can cause swelling of brain tissue and neurological damage, but lowering the temperature of the affected region helps alleviate swelling and minimize damage. The cooling probe, a miniature heat exchanger, operates with an adjustable temperature probe to treat brain swelling precisely and effectively.

High-Tech Brain Implant Predicts, Prevents Epileptic Seizures

U.S. Patent 8,165,682 (ANL-IN-05-062)

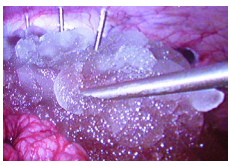
Argonne's advanced brain implant system—the first of its kind—can predict an epileptic seizure before it starts and induce hypothermia to the affected region quickly enough to suppress the seizure. The system consists of miniature brain implants with a small external monitoring unit. One implant predicts epileptic neuron activity by measuring local changes in brain temperature. An array of probes in the brain rapidly cools the epileptic zone to suppress seizures.



Endoscopic Electron Beam Cancer Therapy

U.S. Patent 7,312,461 (ANL-IN-04-067)

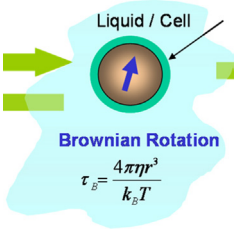
Argonne researchers have designed a sub-millimeter-size electron beam for cancer treatment. The tiny beam is delivered through a laparoscopic tube inserted in a small incision and positioned directly at the tumor. The beam can vary energy from 1 million electron volts (MeV) to 10 MeV, covering tumors of 0.5 cm to 5 cm, respectively. The beam offers cost-effective treatment in previously inoperable or radiation-sensitive areas of the body.



Therapeutic Hypothermia-Protective Cooling Using Medical Ice Slurry

U.S. Patents 6,244,052; 6,413,444; 6,547,811; and 7,422,601 (ANL-IN-99-062, -03-118, -04-008, -05-005, -07-047, -07-093, 09-079)

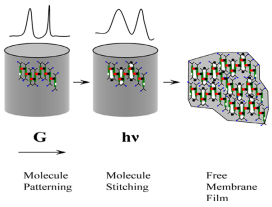
Argonne has created a device that produces a medical ice slurry coolant that induces therapeutic hypothermia. This proprietary equipment makes slurry in less than two minutes, is easy to use, and delivers the slurry selectively to specific organs by way of tiny catheters through laparoscopic ports. Advances in medicine have shown the protective nature of cooling critical organs.



Magneto-Optic Biosensor Uses Bio-Functionalized Magnetic Nanoparticles

U.S. Patent 7,639,359 (ANL-IN-05-122)

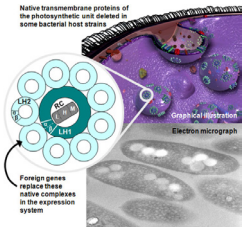
Argonne has developed a magneto-optic biosensor, using magnetic nanoparticles with biological function capability, to enable scientists to measure local rheological properties or chemical binding events. The biosensor works when an external magnetic field and laser are applied to the nanoparticles held in suspension.



Molecule Nanoweaver Creates High-Tech Medical Patches and Multilayered Capsules for Improved Drug Delivery and Treatment Efficacy

U.S. Patent 7,501,483 (ANL-IN-04-103)

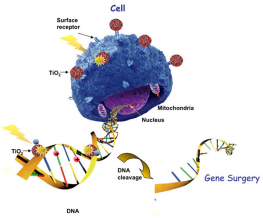
Using the capabilities of nuclear magnetic resonance, Argonne scientists have created the Molecule Nanoweaver, a unique tool that manipulates molecules into useful patterns. The nanoweaver enables the fabrication of high-tech patches, multilayered capsules, and other medical products. The ability to work at the molecular level offers a game-changing approach to medical treatment and drug delivery.



A Rhodobacter System for the Expression of Membrane Proteins

U.S. Patents 6,465,216; US2011/0244524; and 13/619,406 (ANL-IN-99-089, -05-048, -06-099)

Argonne has created a system using Rhodobacter, a photosynthetic bacterium, to express heterologous membrane proteins. Membrane proteins perform a myriad of essential functions. Accordingly, they account for more than 60% of drug targets. The Rhodobacter system is advantageous for its lower production costs, ease of purification, scalability, and high yields.



Metal Oxide Semiconductor Nanoparticles Open the Door to New Medical Innovations

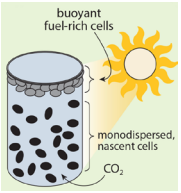
U.S. Patent 6,677,606 (ANL-IN-00-033)

Argonne-invented nanometer-sized metal oxide semiconductors allow scientists to target, initiate and control in vitro and in vivo chemical reactions in biological molecules, such as DNA, proteins and antibodies. Chemically linking biomolecules to specially-designed inorganic nanoparticles creates a sort of "conductive wire" that can initiate chemical changes in the linked biomolecule and any complexes it may have formed with other biological macromolecules.

Three-Dimensional Thermal Tomography Advances Cancer Treatment

U.S. Patents 7,365,330 and 7,538,938 (ANL-IN-05-125, -06-017, and 09-081)

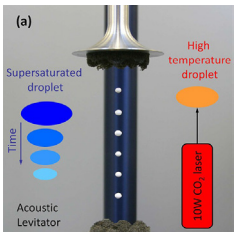
Argonne's three-dimensional thermal tomography enhances the treatment experience for breast cancer patients by detecting early skin changes and enabling earlier preventive treatment. Because cancer cells typically have a higher temperature than normal cells, they are detectable through thermal imaging.



Engineering Biofuels from Photosynthetic Bacteria

U.S. Patent Application 2011/0302830 (ANL-IN-09-001)

Producing fuel from renewable energy sources has so far faced numerous obstacles. Recently, however, Argonne has created biofuels from photosynthetic bacteria. The fuels are produced from agricultural feedstocks under a method that combines both engineered and natural photosynthetic mechanisms and overcomes many of the previous challenges.



Synthesizing Pharmaceuticals Using Containerless Processing

U.S. Patent Application 2012/0197005 (ANL-IN-10-011)

Amorphous preparations of drugs, unlike crystalline forms, have higher solubility and bioavailability. However, preparation of amorphous drugs is difficult. Argonne scientists have developed a novel method for amorphous pharmaceutical preparation. The process involves acoustic levitation—suspending an object through pressure created by sound waves—to form molecular gels and amorphous solids. The process is expected to help pharmaceuticals manufacturers create drugs that dissolve more quickly on delivery.