



RESEARCH & DEVELOPMENT COUNCIL OF NEW JERSEY

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2024 Edison Patent Awards Celebrates 67 Trailblazers in Innovation

45th Annual Awards Ceremony Highlights New Jersey's Legacy of Scientific Advancement with Global Impact

Chatham, N.J. – Last night with nearly 300 guests present, the Research & Development Council of New Jersey (R&D Council) honored New Jersey patents and inventors during the 2024 Edison Patent Awards. In its 45th year, the Edison Patent Awards, the highest recognition of innovation in the state, celebrated 14 patents created by 62 inventors and five individual award winners. With the theme “Jersey Innovates, the World Takes,” the Edison Patent Award Ceremony and Reception was held for the first time at Bell Works in Holmdel, New Jersey.

Computer science pioneer Brian Kernighan, Ph.D., New Brunswick Development Corporation President Christopher Paldino, Rowan University Provost Anthony Lowman, Ph.D., New Jersey Commission on Science, Innovation and Technology Executive Director Judith Sheft, and Hackensack Meridian Health’s Center for Discovery & Innovation researcher Olivier Loudig, Ph.D., were honored with individual awards at the ceremony for their extensive contributions to innovation in the Garden State.

2024 Edison Patent Award winners are BASF Environmental Catalyst and Metal Solutions, Bristol Myers Squibb, Colgate-Palmolive Company, ExxonMobil Technology & Engineering Company, Merck & Co., Inc., Nokia Bell Labs, Princeton Plasma Physics Laboratory, Princeton University, Qualcomm Incorporated, Rowan University, Rutgers, The State University of New Jersey, Siemens Foundational Technologies, and the U.S. Army. The recognized patents range from a surgical robot designed for femur fractures to technology that improves mobile communications.

“These inventors, patents, and innovation leaders have made a tremendous impact on our state and on our world. and each one is a living tribute to this year’s theme: Jersey Innovates, the World Takes,” said New Jersey Governor Phil Murphy in a congratulatory message to the award winners. “That has always been the story of New Jersey. From the lightbulb to the transistor to the motion picture industry. The next great chapter of New Jersey’s innovation story is being written by these award winners.”

Winners were selected by a team of R&D Council researchers who evaluated patents for the significance of the problem, utility/socio-economic value, novelty, and commercial impact. All winning patents must have at least part of the technical/scientific work completed in New Jersey.

"New Jersey's spirit of innovation has always been a beacon for the world, and this year's theme, 'Jersey Innovates, the World Takes,' embodies that legacy. As we celebrate the groundbreaking achievements of New Jersey inventors and leaders, we acknowledge that every patent and every idea born in this state has the power to transform lives globally. Together, we are not just imagining the future—we are creating it." said Colleen Ruegger, RPh, Ph.D., Chair of the R&D Council Board of Directors and Executive Director, Technical Research & Development at Novartis.

The R&D Council awarded its highest honor, the Science & Technology Medal, to computer science pioneer Dr. Brian Kernighan. Dr. Kernighan received this honor for his work in developing computer

languages and authorship of the first book on the C programming language, leading C to being the most dominant computer language in the world. Dr. Kernighan is a Princeton University professor and retired Bell Laboratories researcher. The Science & Technology Medal is awarded annually to a New Jersey leader for extraordinary performance in bringing impactful innovation to the marketplace.

The Visionary Award was awarded to Chris Paladino, President of the New Brunswick Development Corporation (Devco) and Chief Executive Officer of HELIX NJ. Mr. Paladino was honored for his work in developing HELIX NJ into a world-class innovation and technology hub. The Visionary Award goes to someone who showcases exceptional and transformational leadership in uniting industry, academia and the state in pursuit of creating a research-based economy in New Jersey. The Visionary Award was formerly known as the Chairman's Award in previous years.

The 2024 Educator of the Year Award was presented to Dr. Anthony Lowman, Rowan University Provost and Senior Vice President of Academic Affairs. Dr. Lowman has been instrumental in Rowan University becoming the fastest-growing public research institution in the country. The Educator of the Year Award is presented to an individual for their achievements in the advancement of science and technology education and workforce development across New Jersey.

In recognition of New Jersey's evolving innovation landscape, the R&D Council introduced two new individual awards during its 2024 ceremony: the Catalyst Award and the Emerging Tech Award. The Catalyst Award honors an individual who significantly supports the innovation ecosystem within New Jersey and the Emerging Tech Award is presented to a New Jersey individual, team or organization whose early stage inventions or innovations have the potential to make a significant impact on the marketplace.

The inaugural Catalyst Award was presented to Judith Sheft, Executive Director of the New Jersey Commission on Science, Innovation and Technology. Judith strengthens the state's innovation economy by stimulating academic-industrial collaboration, and encourages and supports entrepreneurs and inventors. Hackensack Meridian Health's Center for Discovery & Innovation Associate Member Dr. Olivier Loudig received the inaugural Emerging Tech Award for his innovative efforts in biomarker discovery in breast and lung cancer.

Each winner was celebrated with a special tribute film which can be found [here](#). For more information on the award winners, the event, or the R&D Council, please contact R&D Council Executive Director Kim Case at 908.875.7167 or email kcase@rdnj.org. This release and more information about this event can also be found online at www.rdnj.org.

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As the Research & Development Council of New Jersey, we collaborate among industry, academia, and government to grow and strengthen STEM in education, innovation, and the economy. The R&D Council is a nonprofit 501(c)(3) organization whose membership includes representatives from academia, government, and industry, including several Fortune 500 companies. More information can be found at the R&D Council's website: www.rdnj.org.

Growing STEM. Advancing Innovation. Impacting the World.

Summary of 2024 Edison Patent Award Winners

A team from BASF Environmental Catalyst and Metal Solutions (ECMS) and Heesung Catalysts Corporation (HCC) were recognized with an Edison Patent Award in the Environmental category for “TWC System for Fuel-cut NO_x Control” (U.S. 11,904,299). The patent team consisted of BASF ECMS inventors Xiaolai Zheng and Patrick L. Burk (retired), along with HCC inventors Jinwoo Song and Jun Lee. The invention is related to an innovative Three-Way Conversion - NO_x Trap (TWC-NT) technology for fuel-cut NO_x control in gasoline-powered passenger vehicles. The TWC-NT technology treats NO_x extraordinarily well under modern engine operation conditions and provides substantially lower tailpipe emissions in comparison with conventional TWC catalysts. As a benefit, carmakers can calibrate gasoline vehicles with more frequent fuel-cuts for a better fuel-economy. This technology was well-received by automobile OEM's and commercialized for use in gasoline aftertreatment systems because it filled a critical need in the market.

Bristol Myers Squibb Co. and its inventors Peter Cheng, James Corte, Sutjano Jusuf, Lawrence Kennedy, Hao Zhang, Kumaravel Selvakumar and former employees Robert Kaltenbach III, Jun Li, Jun Shi, Yan Shi, Shiwei Tao, Steven Walker, Tianan Fang, as well as Syngene and its inventor Suresh Dhansu and former employee Ramesh Reddigunta, were recognized with an Edison Patent Award in the Pharmaceutical category for “Carbamoyloxymethyl Triazole Cyclohexyl Acids as LPA Antagonists” (U.S. RE49,352 E). The patented LPA 1 (lysophosphatidic acid receptor) antagonists (with improved safety and physicochemical profiles vs earlier compounds) include the drug candidate admilparant (formerly BMS-986278), which was studied in a large 26-week Phase 2 clinical trial for patients with idiopathic pulmonary fibrosis (IPF) and progressive pulmonary fibrosis (PPF). In this trial, admilparant reduced the rate of decline in lung function (as measured by forced vital capacity [FVC]). Admilparant is currently being studied in two Phase 3 clinical trials for the treatment of IPF and PPF, and if these are successful, would represent an alternative novel treatment for IPF and PPF patients, who have high rates of morbidity and mortality.

Colgate-Palmolive Company and its inventors Shaoyi Zhang, Carl Myers, Guofeng Xu, and a former employee Saide Tang, were recognized with an Edison Patent Award in the Consumer category for “Oral Care Compositions and Methods “ (U.S. 10,918,580 B2), which describes a method to improve the oxidative stability of stannous fluoride in dentifrice formulations. Stannous fluoride is the predominant therapeutic active in over-the-counter dentifrice formulations for the treatment of gingivitis, cavity, and sensitivity. It is naturally unstable, however, and can easily oxidize in water and oxygen-containing environments, resulting in loss of function. This patent applies a previously undiscovered interaction between chelated-stannous fluoride and nitrate ions, such that oxidative stability is vastly increased and efficacy is maintained. This discovery will be implemented in the global relaunch of our leading therapeutic toothpaste, Colgate Total, now behind Preventative Oral Health. It has already launched in Latin America and will be coming soon to the rest of the world.

ExxonMobil Technology & Engineering Company and its inventors Suzzy C. Ho, Jo Ann M. Canich, Machteld M. Mertens, Periagaram S. Ravishankar, Patrick S. Byrne, and Lisa B. V. Stefaniak were recognized with an Edison Patent Award in the Enabling Technology category for “Mitigation of Catalyst Inhibition in Olefin Polymerization” (US 9,382,344). The invention pertains to the improvement of polymerization processes using recycle streams, and addresses the issue of reduced catalyst efficiency caused by impurities. The technology, which targets both prevention and elimination of impurities, has been implemented commercially in multiple ExxonMobil plants which produce Exact™ plastomers, Vistalon™ rubber, Vistamaxx™ performance polymers, and SpectraSyn™ Elite mPAO basestocks. The technology has been deemed a Best Practice for all ExxonMobil manufacturing sites of these products.

Merck & Co., Inc. and its inventors Luke Schenck, Athanas Koynov, George Zhou and Aaron Cote were recognized with an Edison Patent Award in the Animal Health category for the “Process for Preparing Large Size Isoxazoline Particles” (U.S. 11,858,904). The unique crystallization route delivers an optimal particle size in support of outstanding research that led the latest innovation in parasiticide treatment for dogs. The process comprises maintenance of constant supersaturation within the metastable region at temperatures conducive to accelerated crystal growth. Herein, a portion of the crystallization slurry is

continuously recycled, heated to dissolution and returned to the crystallizer to deliver a reproducible, robustly controllable, and scalable crystallization yielding particle size distributions not attainable by conventional means.

Nokia Bell Labs and its inventor Nakjung Choi, along with former employees Binh Nguyen and Marina Thottan, were recognized with an Edison Patent Award in the Telecommunications category for “Programmable System Architecture for Routing Data Packets in Virtual Base Stations” (U.S. 10,079,755 B2). The patented innovative approach enables the practical realization of virtualized radio access networks (vRANs) at scale, resulting in highly flexible, programmable, and composable base stations. This invention set the stage for the commercial deployment of vRANs by enhancing network programmability and enabling the exposure of base station control functionalities. Thanks to this invention, mobile networks are now able to adapt to services and end-user applications in a more dynamic and tailored manner, resulting in a significantly enhanced user experience.

The U.S. Department of Energy’s Princeton Plasma Physics Laboratory and its inventor Dr. David Gates were recognized with an Edison Patent Award in the Energy category for the “Planar Coil Stellarator” (U.S. 12,009,111) patent. This innovative approach provides an improved configuration for a stellarator that is simpler and more practical. In particular, this invention provides a significant simplification by utilizing planar coil magnets, replacing the complicated, intricate coils employed in traditional stellarator systems. This invention has led to the founding of Thea Energy, a startup based in Kearny, NJ. Stellarators based on this novel design concept have the potential to address a key limiting factor that previously had posed a challenge to the stellarator as a source of commercial fusion power generation.

Princeton University and its inventors, Naveen Verma, Hongyang Jia, and Hossein Valavi, were recognized with an Edison Patent Award in the Computing Technology category for “Configurable In-memory Computing Engine, Platform, Bit Cells and Layouts Therefore” (U.S. 11,669,446). The patented innovative approach provides methods for integrating a robust and scalable form of analog in-memory computing into full and programmable computing systems. Analog in-memory computing breaks the decades-old paradigm of von Neumann computing, which separates where data is stored from where it is processed on a chip. For modern AI systems, such separation introduces critical bottlenecks to moving the vast amounts of data required, and the use of digital computation leaves untapped the orders-of-magnitude efficiency gains possible from analog computation, by treating signals as continuous values rather than just zeros and ones. The new methods break through the traditional barriers of noise sensitivity of analog computation and restricted programmability and scalability to applications of in-memory computing. The discovery has the potential to improve the energy efficiency of computing future AI workloads by orders of magnitude.

Qualcomm Incorporated and its inventors Nazmul Islam, Sundar Subramanian, Junyi Li, Navid Abedini, and former employee Bilal Sadiq were recognized with a patent award in the Communication Technology category for “RACH Conveyance of DL Synchronization Beam Information for Various DL-UL Correspondence States” (US 11,026,261B2). Technology in the 261 patent enables wireless devices to select a preferred downlink beam from a base station and use it to transmit an access message associated with the corresponding beam. This improves link performance by increasing the likelihood that a base station and a device are communicating on the best downlink and uplink beams. The technology helped to realize mobile communications over millimeter wave frequencies, which has enabled a host of new use cases and services as well as provided opportunities to reduce the cost of delivering data.

Rowan University and its inventor Mohammad Abedin-Nasab were recognized with an Edison Patent Award in the Medical Technology category for “Surgical Robot” (US 10,603,122 B2). This groundbreaking innovation addresses significant challenges in femur fracture surgeries, which currently suffer from high rates of malalignment and complications. The patented surgical robotic system enhances precision by providing force insertion capabilities and a vast surgical workspace. This technology reduces reliance on numerous intraoperative X-rays and trial-and-error alignment, leading to shorter surgeries and improved patient outcomes. It marks a significant advancement in orthopedic surgery, promising to improve alignment, reduce reoperations, and enhance overall procedural success.

Rutgers University inventors Charles Dismukes, Anders Laursen, Karin Calvino, and Martha Greenblatt were recognized for an Edison Patent Award in the Environmental category: “Nickel phosphide catalysts for direct electrochemical CO₂ reduction to hydrocarbons” (U.S. 10,676,833). This family of solid-state binary compounds serve as catalysts that are powered by electricity instead of thermal energy. They convert water and carbon dioxide selectively to various feedstocks that can produce valuable chemicals, fuels and polymers. The electrocatalytic process can replace petrochemical sources of these materials and is environmentally carbon negative (net consumption of carbon dioxide). These patents have been licensed to the Rutgers’ Startup RenewCO₂ cofounded by Drs Calvino, Laursen and Dismukes. The mission of RenewCO₂ is to scale up this technology for environmental applications. The Startup, now incorporated, is working with its investors under the leadership of Drs. Laursen (CEO) and Calvino (CTO).

Rutgers University and its scientists, Drs. Abraham Pinter and Alok Choudhary, were recognized with the Edison Patent Award in the Medical Diagnostics category for their patent titled “Anti-LAM and Anti-PIM6/LAM Monoclonal Antibodies for Diagnosis and Treatment of Mycobacterium Tuberculosis Infections” (U.S. 10,729,771). Their team isolated novel human monoclonal antibodies against a major component of the Mycobacterium Tuberculosis cell wall called lipoarabinomannan (LAM), which is secreted in small quantities into the urine of patients with active tuberculosis (TB) infections. TB is the world’s most lethal infectious disease and is the major cause of death in patients co-infected with HIV-1. There is a need for a faster and more accessible point-of-care test for TB so that patients can be identified and treated with effective drugs as soon as possible. The novel antibodies described in the patent are highly specific for the forms of LAM that are present in the urine of patients with active TB, and their studies have contributed to a sensitive point-of-care assay for diagnosing this disease.

Siemens Foundational Technologies and its inventors Amit Chakraborty, Biswadip Dey, and former Siemens employee Yaofeng Zhong were recognized with an Edison Patent Award in the Emerging Technology category for “Physics Informed Neural Network for Learning Non-Euclidean Dynamics in Electro-Mechanical Systems for Synthesizing Energy-Based Controllers” (US 11,922,134 B2). This patent outlines the development of a novel artificial intelligence (AI) and machine learning (ML) approach for controlling industrial applications. This approach uses machine learning to model system dynamics in complex electromechanical systems to synthesize a controller while exploiting known physics laws to help make the AI/ML model more generalizable even with limited datasets. These controllers are applicable in industrial processes, energy, defense, pharmaceuticals, and a wide variety of other fields.

US Army DEVCOM Armaments Center inventors Misterys Nikolas Ioannidis, Viral Panchal, Francis Sullivan, and Philip Abbate, working with partners Drs. Costas Gogos and Zohar Ophir from the New Jersey Institute of Technology (NJIT) and Dr. Ming Wan Young from the Polymer Processing Institute at NJIT, were recognized with an Edison Patent Award in the Defense category. Their patent, “Continuous Process for Producing Foamable Celluloid (FC)”, No. 11,780,141 B1, represents a new and innovative process for developing fast burning, moisture resistant and dimensionally stable new material for combustible cartridge casing and other next generation ammunition systems. The FC combustible casings are lighter, require less material handling, and are capable of delivering additional energy for propulsion, resulting in more efficient ammunition performance.