

The Nanotechnology Institute™ & Energy Commercialization Institute Award \$340K for Technology Commercialization

PHILADELPHIA, PA – **The Nanotechnology Institute™** (NTI) and the **Energy Commercialization Institute** (ECI) awarded a total of \$340,000 to five university-based technology commercialization projects.

NTI is the region's first multi-institutional partnership created to accelerate nanotechnology commercialization and company formation. Ben Franklin Technology Partners of Southeastern Pennsylvania, the University of Pennsylvania and Drexel University created the NTI in 2000 to coalesce the region's efforts around nanotechnology and created its sister organization, the ECI, in 2009 to focus on emerging technologies in cleantech. Both Institutes are initiatives of the Pennsylvania Department of Community and Economic Development, and is funded by the Ben Franklin Technology Development Authority.

"Today, the NTI and ECI have more than 1000 Intellectual Property assets under management, have executed over 100 licenses and supported over 50 spin-outs and start-ups. Successful spin-outs include Vascular Magnetics (CHOP), Graphene Frontiers (Penn), Equalix (Drexel and Temple) and Nelum (Penn). In addition, they have attracted more than \$350M in public and private investment to the region," said Anthony P. Green, Ph.D., Vice President of Technology Commercialization for Ben Franklin, and Ben Franklin Director for the NTI and ECI.

These funding awards were divided into two categories:

- **Program to Support Translational Research Fund (PSTR) Awards** fuel the research of commercially feasible technology to move from concept into enterprise development. These awards are provided to previously supported projects that demonstrated the greatest progress towards commercialization.
- **Sponsored Research Agreement (SRA) Match** provides capital for research to stimulate the creation of longer-term partnerships with industry leaders, and to create new enterprises.

Projects:

Super Ion Conducting Nanofiber Fuel Cell Electrodes

Principal Investigator: **Yossef A. Elabd, Ph.D., Drexel University**

Program: The Nanotechnology Institute, PSTR Award

Award: \$75,000

Automakers have engineered solutions to many of the major hurdles to bring fuel cell vehicles to the market place, such as durability, reliability, lifetime performance, safety, and fuel storage. However, the high cost of precious metal platinum electrodes, which contributes to over 30% of the fuel cell engine cost, continues to be a major factor that has limited the mass commercialization of fuel cell vehicles.

At Drexel University, we have produced super ion conducting nanofiber electrodes for fuel cells with our new electrospinning/electrospraying (E/E) technology. This new technology results in electrodes that provide high fuel cell performance much less platinum required, thereby greatly reducing the overall cost of the fuel cell.

Sprayable, Transparent, Superamphiphobic Coatings

Principal Investigator: **Shu Yang, Ph.D., University of Pennsylvania**

Program: The Nanotechnology Institute, PSTR Award

Award: \$75,000

Building windows and roofing, solar panels, car windows, windshields, smartphone screens and computer displays are constantly exposed to damaging environmental conditions, including dirt, oil, acid water, sand, ice, salt, sun, pollution, and bird droppings. These surfaces require frequent cleaning to maintain performance. However, cleaning requires intensive labor and energy consumption.

In collaboration with Nelum Sciences, LLC, a startup company co-founded by the PI and the University of Pennsylvania, we developed a spray coating technique and formulation to create transparent, superhydrophobic and superoleophobic surfaces from silica nanoparticles that can be scaled for viable commercial products.

Highly Conductive Nanostructured Membranes for Batteries

Principal Investigator: **Yossef A. Elabd, Ph.D., Drexel University**

Co-Principal Investigator: **Karen I. Winey, Ph.D., University of Pennsylvania**

Program: Energy Commercialization Institute, PSTR Award

Award: \$75,000

Lithium ion batteries are currently the leading commercial technology for portable electronic devices and hybrid electric vehicles. They are projected to be a \$50 billion industry by 2020 while capturing over 80% of the rechargeable battery market share. However, the U.S. Department of Energy suggests that high manufacturing costs and concerns about battery safety and stability may hinder the market growth of the lithium ion battery.

At Drexel University and the University of Pennsylvania, we are developing a promising solid polymer electrolyte technology for lithium ion batteries that could overcome current technologies. We call this new technology PILbloX, for polymerized ionic liquid block copolymers. Our PILbloX technology joins the advantages of a nanostructured morphology in block copolymers and the unique physiochemical properties of polymerized ionic liquids. To date these novel materials show good ion conductivity, mechanical toughness, and electrochemical stability.

Semiconducting Ferroelectrics for Robust and Efficient Oxide Photovoltaics

Principal Investigator: **Andrew M. Rappe, Ph.D., University of Pennsylvania**

Co- Principal Investigator: **Jonathan E. Spanier, Ph.D., Drexel University** & **Peter K. Davies, Ph.D., University of Pennsylvania**

Program: Energy Commercialization Institute, PSTR Award

Award: \$75,000

Current first-generation Silicon-based solar cells are expensive to fabricate due to the use of clean-room techniques and due to the large amounts of Silicon necessary to absorb light. Second-generation thin-film solar cells require less material and are therefore less expensive. Yet the success of photovoltaic (PV) devices for energy generation will require even more drastic reduction in cost while maintaining or improving efficiency. We are pursuing the use of ferroelectric semiconducting materials as a new class of PVs in order to achieve these goals.

Development of a point of care (POC) bionanosensor-based diagnostic device for the detection of Liver Cancer

Principal Investigator: **Johann deSa, Ph.D., Drexel University**

Co-PI: **Ryszard Lec, Ph.D., Drexel University**

Program: The Nanotechnology Institute™, SRA

Award: \$40,000

As healthcare advances towards personalized care, there is an urgent need for rapid, sensitive, and inexpensive diagnostic and treatment monitoring devices for cancer. Historically, most diagnostic devices have been based on optical technologies that, although highly successful and reliable, are expensive, complex, and bulky laboratory based systems requiring samples to be sent to centralized laboratories for processing and testing. This leads to long turn-around times and requires multiple patient visits.

To address this need, the BioNanoSensor (BNS) group at Drexel University is developing a Point of Care (POC) test based on its proprietary label-free piezoelectric technology, wherein a sample from a finger-prick is deposited onto a disposable cartridge, following which the test results are provided within 10-15 minutes. This technology is easily scaled, miniature, rapid,

sensitive, inexpensive, and does not require skilled personnel to operate.

About Ben Franklin Technology Partners of Southeastern Pennsylvania

Ben Franklin is celebrating 30 years of helping our region's talented entrepreneurs bring their ***Dreams to Reality***. Ben Franklin is a national, award winning organization for ***Stimulating Entrepreneurial Potential***, through entrepreneurship, technology and innovation. We grow technology companies and partnerships through the ***Capital, Knowledge and Networks*** that help innovative enterprises compete in the global marketplace, generating wealth and supporting regional economic growth. Ben Franklin has invested more than \$165 million to grow more than 1,750 regional enterprises, across all areas of technology. It has launched university/industry partnerships that accelerate scientific discoveries to commercialization. The Ben Franklin Technology Partners is an initiative of the Pennsylvania Department of Community and Economic Development and is funded by the Ben Franklin Technology Development Authority.

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