2015

John Badding, professor of chemistry in the Eberly College of Sciences (Physical Sciences medal), has made significant advances in solid state fibers. He's altered the structure of optical fibers, which have transformed the telecommunications industry and enabled the Internet to introduce semiconductor properties, infrared wavelength transmission and solar photovoltaic response. Also, he introduced a new form of carbon nanotube — diamond threads which researchers suspect will be much stronger than traditional glass fibers and will have a host of new practical uses in communication and beyond.

"Relatively few individuals have the originality and ability to see beyond the accepted norms and to move their field in entirely new directions," said a nominator.

Badding's research shows that optical fibers comprised of refractory-compound semiconductors can be deposited in capillaries, opening a new field of infrared optical fiber materials of great promise for ultra-high power infrared photonics, lasers and waveguides not possible with conventional fibers.

A nominator said this achievement is a "really clever way to make unconventional fibers of great purity and perfection in structure," adding that this kind of research fuels "materials of the energy future. The moment he did it, it was obvious that this was both a major achievement and a wonder why it had not been done before."

Robert Nairn, professor in the school of music in the College of Arts and Architecture (Arts and Humanities medal), is an internationally recognized performer and teacher considered one of the foremost historical performers on the double bass, was recognized for his numerous contributions to music and his students.

Historically informed performance is designed to gain and illustrate insight into the performance practice of the era in which a work was created.

Nairn has appeared on 16 recordings since 2008 and six in the past year. His recordings have been widely praised in the press, including a recording of duos for cello and bass called "a quietly impressive virtuosity" by American Record Guide and "the most charismatic performance" by Choral Magazine.

He's a founding member of Juilliard Baroque, an ensemble that brings together nine of the world's most respected and accomplished period-music specialists. He's principal of the acclaimed Boston Early Music Festival, the world's largest and most respected early music festival boasting numerous Grammy awards.

In 2009, Nairn was lauded by the International Society of Bassists with an award for Historically Informed Performance, just the third time such an award was given.

"Holding a full-time teaching position at a university, while simultaneously serving as a principal player in three professional ensembles and two summer music festivals is remarkable," said a

colleague. "That he does so while also receiving praise from colleagues and students for his teaching is a testament to his dedication."

Song Tan, professor of biochemistry and molecular biology in the Eberly College of Science (Life and Health Sciences medal.) His work on the atomic structure of chromosomal regulatory proteins bound to nucleosomes has been called a "game-changer" by leading researchers and could hold clues to a cancer cure. Misregulation of the nucleosome — the fundamental unit of the nucleus and the means by which are genes are packed — is a major cause of cancer.

These findings provide fundamental knowledge and important implications for understanding diseases including autism, schizophrenia and intellectual disabilities.

"Tan's discoveries are a great example of how truly exceptional science at the fundamental level always has deep ramifications for the human condition," said a colleague.

Tan stands alone in his achievement. No other lab has been able to determine the atomic structure of a regulator attached to the nucleosome. Tan has done this twice. Nucleosomal research is particularly tricky. His lab is one of a few worldwide able to generate co-complexes with other proteins with regularity.

A colleague offered this analogy: "Tan has been discovering complete dinosaur fossils when others are discovering jawbones."

His work accomplishes three feats — it sets the gold standard for determining all other regulator-nucleosome structures; it provides a much more useful framework for drug modeling; and it lends insight into fundamental biological questions.

Robert J. Turrisi, professor of biobehavioral health and Prevention Research Center in the College of Health and Human Development (Social and Behavioral Sciences medal), had a hunch. He thought the bond incoming college students share with their parents could lessen the risks of underage drinking. His theory wasn't shared by most in his field, who thought the teens had already cut the parental cord.

He developed an innovative intervention aimed at parents of new students. It encouraged parents to take advantage of the window of opportunity when teens are about to transition to college life. What's key, he stresses, is for parents to talk with their children about binge drinking the summer before the teen leaves for college using his defined practical advice for doing so. He also teaches parents to effectively monitor their child in college while still respecting their independence.

"No one thought this intervention had a chance of being successful," said a colleague, adding that recent rigorous clinical trials have shown significant reductions in binge drinking. "This research not only exemplifies Turrisi's creativity and insight, but also his willingness to persist against skepticism when his ideas are counter to the zeitgeist in his field."

Another said his "careful research has opened up a new way of thinking about parents' roles in their children's health-related behavior after their children leave home."

Turrisi is prolific at securing research funds. In the past decade, he's received more than $10 million from various national organizations. It's opened doors for him and his graduate students. His grant activity has more than doubled in the past five years.

Additionally, Turrisi has turned his knowledge toward the prevention of skin cancer, and reducing the use of tanning beds among teens and young adults.

Qiming Zhang, distinguished professor of electrical engineering (Engineering medal.) His research in electrocaloric materials and development in ECE cooling devices has spawned a promising approach for environmentally friendly cooling devices.

Cooling and refrigeration, which accounting for about 20 percent of electricity consumption in the U.S., is based on century-old technology that emits large amount of greenhouse gases. Zhang has pioneered the field of electrocaloric polymers and has developed technology of the future — high-efficiency, environmentally friendly cooling materials and devices. His work has been published in more than 280 peer-reviewed publications and has been cited more than 14,000 times.

Zhang has exploited the remarkable properties of these materials to suggest future applications such as chip-scale cooling devices and electrocaloric refrigerators without external regenerators. The practical implications for these new materials are widespread.

Due to the economic and environmental implications of the research, Zhang's findings have captured enormous attention from the cooling industry and general public.

Noting that Zhang's work is inspired by the global need to increase the energy efficiency of common devices, a colleague said his efforts have "significantly enhanced the reputation of Penn State."

Established in 1980, the Faculty Scholar Award recognizes scholarly or creative excellence represented by a single contribution or a series of contributions around a coherent theme. A committee of peers reviews nominations and selects candidates.