Six receive Faculty Scholar Medals

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UNIVERSITY PARK, Pa. — Six Penn State faculty members have received 2021 Faculty Scholar Medals for Outstanding Achievement.

They are Amy Allen, liberal arts research professor of philosophy and...
women's, gender, and sexuality studies in College of the Liberal Arts; Pamela Cole, liberal arts professor of psychology and human development and family studies in College of the Liberal Arts; Chad Hanna, associate professor of physics and astronomy and astrophysics in Eberly College of Science; Manuel Llinás, professor of biochemistry and molecular biology, and chemistry in Eberly College of Science; John Mauro, professor of materials science and engineering (MatSE) in College of Earth and Mineral Sciences; and Joshua Robinson, professor of MatSE in College of Earth and Mineral Sciences.

Established in 1980, the 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.

Amy Allen

Nominators said Allen, who is head of the philosophy department, is a leading expert in critical social theory, feminist theory and the philosophy of history, "through which she has engaged relevant matters of social identity and difference, social inequality, and social change."


“One of the most striking aspects of Allen’s work is her unique ability to bring together philosophical rigor and conceptual clarity with a focus on pressing social and political challenges and an unwavering ethical commitment to justice and improving the human condition,” a nominator said.

In perhaps Allen's best known book, "The End of Progress," Allen takes aim at presumptions that human history coincides with human progress. Accepting historical progress as fact, Allen argues, impedes political progress in postcolonial contexts. The title echoes a quote from one of the founders of the Frankfurt School of Critical Theory, which suggests that “progress occurs where it ends.”
Allen argues that critically interrogating ideological claims about historical progress will pave the way for genuine de- and post-colonial progress that listens to the voices of under-represented.

In her latest work published in 2020, “Critique on the Couch: Why Critical Theory Needs Psychoanalysis,” Allen further targets the legacies of the Frankfurt School. Her approach uses psychoanalysis to allow critical theory to address modern humanity’s destructiveness. This approach, nominators said, will lead to a “more progressive self-transformation, social change and emancipation.”

**Pamela Cole**

Nominators said Cole is a leading researcher in the development of emotional regulation in early childhood, with specific implications for the development of school readiness and risk for psychopathology. Her work includes cross-cultural variations in emotional development, which corrects prior research that favored children from privileged or advantaged families.

A researcher and educator for more than 35 years, Cole’s research throughout her career continues to shape her field. Nominators said her contributions in a broad range of topics rely on “innovative leading-edge, multi-method and interdisciplinary approaches” to advance our understanding of emotional development among children.

Specifically, nominators cited Cole’s contribution to understanding the dynamics of children’s self-regulation of emotion, which she began working on in the mid-1980s. Her work points out that there are different ways that children’s attempts to regulate emotion can be ineffective, which can predict their later competencies or symptoms.

“This research has become a prominent research area that is the focus of numerous scholars in developmental psychology, child clinical psychology and allied fields,” a nominator said. “The growth of this area of research is in no small part the result of the work of Dr. Cole and her collaborators.”

Cole offered the first evidence that children as young as age 3 spontaneously regulate their displays of disappointment. Before then, experts assumed emotions were only regulated intentionally after children were able to be aware of the rules of displaying emotions.

Cole’s work, nominators said, demonstrates the profound impact emotional regulation can have on a child’s life. Cole’s research team found links between emotional regulation and behavior problems in preschool-age children, which is a factor in the high rate of preschool expulsion. This research paved the
way for research by Cole and others demonstrating that poor emotional regulation contributes to a host of behavioral problems with lasting consequences reaching into adolescence.

In longitudinal research funded by the National Institute of Mental Health, Cole and her colleagues provided the first evidence that early language development contributes to the decline in tantrums and emotional outbursts and how young children's ability to tolerate frustration improves over the course of early childhood. Children who tolerate frustration fare better developmentally later in life.

Cole's work at large, nominators said, created a new framework for studying and understanding self-regulation among children. It has enhanced the methods, findings and research path forward, including innovative work funded by the Eunice Kennedy Shriver National Institute of Child Health and Human Development.

"Cole is a renowned scholar. Her career has been distinguished, including accomplishments in recent years that continue to change the way people think about the development of emotion regulation," a nominator said. "She is also an all-round all-star, with noteworthy contributions to teaching and service."

Chad Hanna

Nominators said Hanna is a growing leader in the field of gravitational wave physics and has an increasingly visible presence in the Laser-interferometry Gravitational Wave Observatory (LIGO) Scientific Collaboration. LIGO is responsible for numerous discoveries — particularly related to black holes — and has benefited from Hanna's expertise.

At LIGO, Hanna developed data analysis pipelines responsible for crucial discoveries such as the gravitational waves generated by the merger of binary black holes and binary neutron stars. The team responsible for this discovery, observed in 2015 and announced by LIGO in 2016, was awarded the 2017 Nobel Prize in physics.

"The first direct detection of gravitational waves emitted by a binary black hole merger in 2015 was hailed as a watershed moment for the world of physics and astronomy," a nominator said. "In the almost five years since that time, observations of binary black hole mergers by LIGO have laid to rest a number of longstanding fundamental questions about high-energy astrophysics and gravity, including: Do black holes form in binary systems? Can they merge in a Hubble time? Do binary black hole mergers seed the formation of more massive black holes? Are the black holes detected by LIGO..."
as predicted by general relativity? Does gravity travel at the speed of light? The answer to all of these questions is ‘yes.’”

Hanna’s group found a way to conduct searches to quickly identify gravitational wave events, which have resulted in quick observations by telescopes. This was key to the groundbreaking discovery of the observation — in both gravitational waves and the entire electromagnetic spectrum — of a merging binary neutron star system in 2017.

LIGO continues to make major physics discoveries including nearly 50 black hole mergers and the merger of two neutron stars. Nominators said Hanna made crucial contributions to these key discoveries.

The signal analysis methods he helped develop that use cutting-edge algorithms led to the rapid identification of the observed signals from merging black holes. He also helped employ automatic alerts that quickly alerted astronomers worldwide that interesting celestial events were occurring. This alert system has been used by LIGO for the past three years.

“Dr. Hanna has proven himself to be a leading scientist who has made forefront contributions to one of the major physics discoveries of modern times,” a nominator said. “He is also a conscientious educator who is committed to improving undergraduate education at Penn State, and he is an excellent research mentor. Finally, he has made energetic and thoughtful service contributions at Penn State and beyond.”

**Manuel Llinás**

Nominators said Llinás has an accomplished record of malaria research that has led to major advances in global health. By continuous pioneering efforts and innovations in the field, nominators said, he has “positioned himself as a visible and effective leader.”

Llinás’ research hits home on several fronts. In 2014, he made a seminal discovery on the molecular mechanisms that drive the life cycle of the malaria parasite. This discovery offers novel opportunities for the development of a desperately needed malaria vaccine. The World Health Organization reports that more than 400,000 people die annually from malaria, two-thirds of whom are under the age of 5.
This research unveiled a fundamental link in the understanding of developmental biology for malaria because it demonstrated how the parasite commits to a sexual cycle. The parasite forms both sexual and asexual stages inside humans. The “sexual stage” parasites are what is transmitted to mosquitoes, which then pass the parasite (via a mosquito bite) to the next human host.

More recently, he and his research group published follow-up studies that identified the exact targets and mechanisms for this master regulator. Specifically, Llinás identified the program guiding the development of a small number of cells capable of being transmitted to mosquitoes. Experts say a transmission-blocking vaccine could be used to halt the spread of malaria.

“This work required the technical innovation that Dr. Llinás is known for, including new and powerful DNA sequencing and transcriptomics techniques,” a nominator said.

As part of the Malaria Drug Accelerator (MalDA) consortium funded in part by the Bill and Melinda Gates Foundation, Llinás is also using his discoveries to identify new therapeutics for the disease. Researchers are seeking the most effective treatment that’s the least likely to develop drug resistance, a growing concern with current therapies.

Through Penn State’s Center for Infectious Disease Dynamics (CIDD) and the Huck Center for Malaria Research (CMaR), Llinás is leading research that explores all stages of the parasite life cycle. His approaches for understanding and combating the parasite dip into several disciplines including genomics, gene regulation, molecular parasitology, biochemistry and metabolomics.

“I have followed the career of Manuel Llinás closely over the past 12 years,” a nominator said. “I consider him among the top investigators worldwide who are studying the molecular and cellular biology of malaria parasites. This international field includes dozens of scientists, including major international program leaders who established their labs many years before Dr. Llinás even began his important work.”

**John Mauro**

Nominators said Mauro is a prolific inventor who advances glass science while creating materials that better our lives and have widespread societal impact. His career, which began at Corning, Inc. before shifting to Penn State in 2017, involves 58 granted U.S. patents and 20 more pending, including several iterations of Corning’s Gorilla Glass. The highly transparent and impact resistant material has been used in more than 3 billion personal
Mauro developed a novel model-driven approach for creating new classes of materials. It relies on the mathematical optimization of composition-dependent property models and utilizes machine learning techniques. The result, nominators said, allows Mauro to decode the “glass genome.” His methods are leading to advances in glass science and the rapid development of new materials that meet a stringent set of requirements. This method breaks the mold of the historic “cook and look” approach for creating new glass materials.

As Mauro aimed to change the way glass materials were understood and invented, he first had to build on the fundamental science. Using a physics-based model, he created a method for accurately understanding the viscosity of glass — which was patented — and used this and other tools to build the basis for his models and theories. His viscosity model, MYEGA, supplanted a century-old model.

Mauro and his team invented a new family of zinc germanosilicate optical glasses, new potassium aluminosilicate glasses to serve as claddings for tunable semiconductor core fiber lasers, new glass-ceramic compositions with improved mechanical properties, and an optimized silica glass with record-low optical scattering. Several patent applications have been filed related to these new inventions.

“Very few researchers have practically enabled a generation of inventors for a whole class of materials in the way that Mauro did,” a nominator said.

In 2020, Mauro helped discover a new method for reducing the optical attenuation of the silica glass found in fiber-optic cable, which is ubiquitous in the data transfer and communications industry. The model reduced signal loss from silica fibers by more than 50 percent, dramatically extending the distance data can travel without the need for amplification. Another discovery, “high strength antimicrobial glass,” led to microbial resistant glass surfaces. Nominators praised the timely discovery amid the COVID-19 pandemic.

“Mauro has also demonstrated consistent personal dedication to making a positive difference on the materials science and engineering community and on society as a whole,” a nominator said.
Joshua Robinson

Nominators said Robinson is an exceptional research, leader, big-picture thinker, mentor and collaborator who, in the early stages of his career, is recognized globally for his impact on two- and three-dimensional materials.

Robinson is a pioneer in synthesizing and characterizing 2D materials such as graphene, a single atom-sized layer of carbon. Graphene is recognized as an impactful new material with a broad range of properties useful for trillion-dollar industries such as super computing, solar energy and health care.

Graphene is a unique material. It’s the thinnest yet strongest material created. It’s as conductive as copper. It’s the strongest heat conductor known. It’s transparent yet so dense even the smallest of gas atoms can pass through it.

Since joining Penn State in 2012, Robinson founded major programs aimed at the creation and application of graphene and transitional metals. He created a new way to create these materials, confinement heteroepitaxy, or CHet, which has led to a new family of 2D semiconductors and polar metals with remarkable properties. These new materials sparked the creation of the Penn State NSF-MRSEC Center for Nanoscale Science.

Nominators said Robinson’s career is remarkable because of his equal dedication to advancing the science as well as advancing the application of the science.

“The environment that Robinson has created for training researchers and fostering collaborative, important work is nothing short of outstanding,” a nominator said. “There are many people in our field who are envious of the ecosystem that he has built.”

Robinson co-created the Center for 2D and Layered Materials, which has grown to nearly 30 faculty and 70 students. The center, which includes interdisciplinary research, secures numerous grants from government agencies such as the National Science Foundation and industry.

He is co-director of the NSF-funded I/UCRC Center for Atomically Thin Multifunctional Coatings (ATOMIC), which brings together 15 industry partners. He is the director of user programs for the Two-Dimensional Crystal...
Consortium, which is funded by the NSF. The consortium provides a national user facility for 2D materials, the first of its kind.

“Robinson is one of the dynamic breakout leaders amongst our University faculty body in nucleating prolific collaborations across and beyond Penn State, leading consortia, innovating a vibrant safety culture, winning teaching awards, fostering diversity and propelling graduate and undergraduate students towards their chosen careers,” a nominator said.

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