UC SANTA BARBARA

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# Scientists to Watch

They're young, they're smart and they're at the forefront of their fields. And now UC Santa Barbara professors Michelle O'Malley and Andrea Young are among Science News's 2019 SN10: Scientists to Watch.

Presented by the Society for Science & the Public, the annual list highlights early- and mid-career scientists tackling today's big questions, with the potential for tomorrow's big breakthroughs.

"Congratulations to all the scientists and engineers named to this prestigious list!" said Maya Ajmera, President and CEO of the Society for Science & the Public and Publisher of Science News. "These amazing women and men are making ground-breaking discoveries. I am delighted that Science News is able to honor them."

**From Plant Waste to Commodity Chemicals**



Michelle O'Malley. Photo by Sonia Fernandez

To find renewable sources for the many commodity chemicals we need to run our modern lives, Michelle O'Malley, a professor of chemical engineering, looked no further than the guts of large herbivores. There, she said, "thousands of unusual anaerobes work together to break down plant biomass into nutrients for the animal." Tapping into the processes these anaerobes have evolved to perform as they extract

sugars from plant waste could make it possible to generate material for biofuels, pharmaceuticals and other chemicals, which are otherwise extracted from nonrenewable sources.

“I think the most fascinating research happens at the intersection of different disciplines,” O’Malley said. Though trained as a chemical engineer, O’Malley spent much of her earliest research immersed in microbiology. That was around the time genetic sequencing became accessible and inexpensive, giving her the tools to explore “non-model” microbes “that nature had already evolved to do some fantastic chemistry.”

“We’re extremely proud of Michelle O’Malley for being named to the highly selective list of just 10 Science News Scientists to Watch from across the nation,” said Rod Alferness, dean of the UCSB College of Engineering. “This is the latest in a string of prestigious awards and notices Michelle has earned recently recognizing the importance of her groundbreaking research. We are, of course, delighted and proud that she is part of the College of Engineering family and know that great things lie ahead for her.”

Said O’Malley, “I am honored to be recognized by Science News as a Scientist to Watch. This is a testament to the creative, hard work of my research group and trainees throughout the years, without which none of this would be possible.”

**Exploring the 2D Universe**



Andrea Young. Photo by Sonia Fernandez

Due to its its strength, conductive and electronic properties and its peculiar physics, graphene — the transparent, atom-thick allotrope of carbon — has been called today’s wonder material.

“These (graphene systems) give you incredible control over subtle states of matter,” said Andrea Young, a condensed matter physicist. “You can start with pencil lead and a blank chip, and with minimal equipment build a bizarre, two-dimensional universe where the laws of physics are quite different than our 3D world.”

It was, in fact, this fascination with graphene's 2D physics that led to Young's co-invention of van der Waals heterostructures — named for the weak, distance-dependent forces between atoms of stacked 2D materials. These heterostructures have since opened up new fields of research for scientists everywhere, from those diving into 2D physics to others interested in the uses and applications of graphene. Young's own research has resulted in the discovery of new quantum Hall phases, and he continues to study the electronic properties of nano-fabricated quantum materials, which have the potential to open up new physics and serve as the foundation for tomorrow's technologies.

"We are proud of Andrea Young's continued success, though not at all surprised that this creative and talented scientist is once again being recognized for his prolific and important work," said Pierre Wiltzius, dean of mathematical, life and physical sciences in the College of Letters and Science. "His research in the area of exotic properties of materials holds great promise for breakthroughs in quantum science and engineering. He truly is a leader in his field."

"I'm very grateful for the recognition from Science News," Young said, "and even more grateful to my hardworking students who make the lab run — I wouldn't be anywhere without them."

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## About UC Santa Barbara

The University of California, Santa Barbara is a leading research institution that also provides a comprehensive liberal arts learning experience. Our academic community of faculty, students, and staff is characterized by a culture of interdisciplinary collaboration that is responsive to the needs of our multicultural and global society. All of this takes place within a living and learning environment like no other, as we draw inspiration from the beauty and resources of our extraordinary location at the edge of the Pacific Ocean.