

Notes From the Editor:

Welcome to the third edition of the PUMRS newsletter, *Materials Today*. I am delighted to introduce new members on the newsletter committee, Julia Lin 25' and Wilder Crosier 25'. Several exciting events are taking place after spring break. On March 14, the Materials Science and Engineering (MSE) Certificate Program will have an open house at Bowen Hall lobby. More details can be found at the end of this newsletter. Additionally, PUMRS is planning a study break at the end of this month. Graduate students in MSE will join to chat about their experience in materials research. Be on the lookout for a study break email!

I would like to thank everyone who contributed to the content of this issue. If you have ideas for future designs, please feel free to contact me. I hope you enjoy a restful spring break!

— Zihan Lin

Upcoming deadlines:

- **March 15th** - NSF program in Integrated Nanomanufacturing
- **March 15th** - Photonics Summer Undergraduate Research
- **March 15th** - NSF program at Engineering Research Center CELL-MET
- **March 15th** - NSF REU Site Program on Sustainable Manufacturing at Wayne State University
- **March 18th** - Extended deadline for selected HMEI internships
- **Rolling admission (typically filled by March 31st)** - Interdisciplinary Materials Science Summer Program at Cornell University in Ithaca, New York
- American Physical Society (APS) Student Ambassador Program

Reminder:

The Reiner G. Stoll Undergraduate Summer Fellowship in Chemical Engineering is funded by the Camille and Henry Dreyfus Foundation. The Stoll Fellow will engage in independent research during the summer under the supervision of a Princeton faculty member. The Chemical and Biological Engineering Department (CBE) may award the fellowship to one or more CBE students each summer. The fellowship consists of a typical summer stipend, approximately 5,400 (600/week over 9 weeks), plus up to \$1,000 towards materials and research supplies. Application is still open until March 15th! Contact **Julie L. Gerek-Sefa** (jsefa@princeton.edu) if you have further questions.

PRISM

Princeton scientists achieve new clarity in visualizing the quantum realm

Feb. 23, 2022 | Tom Garlinghouse | Princeton News, Department of Physics

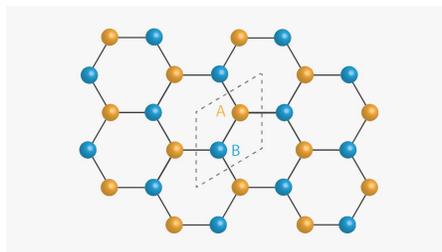


Photo provided by researchers

Researchers at Princeton University have peered into the quantum realm of electrons and have come closer than ever to providing a real picture of what is happening at the nanoscale. A team led by Ali Yazdani studied the interactions between electrons in graphite, a material with single layers of carbon atoms stacked on top of each other, and looked at the complex pattern of electrons determined by the quantum superposition. This is the first time researchers have dived so deeply and with such spatial resolution into the nature of quantum states. The pattern they observed was a structure first recognized by August Kekulé in the late 19th century, and they have found a vortex in the pattern that looks like a hurricane. They also showed that the quantum material exhibits deformations that correspond to the twisting and winding of the electrons' wavefunction.

[Read more on Princeton News](#)

Faculty

Professor Sujit S. Datta receives the 2022 award for porous media research

Feb. 22, 2022 | Department of Chemical and Biological Engineering

Professor Sujit Datta, a soft matter expert, was recognized by the International Society for Porous Media (InterPore) for his "innovative approach to studying porous materials."



[Read more on Princeton CBE News InterPore Award](#)

Self-healing materials for robotics made from 'jelly' and salt – ScienceDaily

Feb. 18, 2022 | University of Cambridge | ScienceDaily

Soft sensors are used in soft robotics to gain information about their systems and surroundings. Researchers at the University of Cambridge have developed a new, soft-sensing hydrogel containing sodium chloride instead of carbon ink. Unlike other sensors, this hydrogel can heal itself at low temperatures, making it more stable and resilient, and it is more accessible and less expensive than currently existing sensors.

[Read More on nature](#)

MIT's New Plant-Derived Material Is Tough As Bone and Hard As Aluminum

Feb. 12, 2022 | MIT | SciTechDaily



Derived from SciTechDaily. Figure provided by researchers and edited by MIT News

Cellulose from the cell walls of plant cells contains cellulose nanocrystals, which are exceptionally strong at the nanoscale level. Scientists at the Massachusetts Institute of Technology have successfully synthesized a resilient material by dispersing cellulose nanocrystals throughout the substance so that they form strong bonds with the polymer molecules instead of clumping together as they usually do.

[Read More on Cellulose](#)

Nano-engineered sealer leads to more durable concrete

Feb. 16, 2022 | Tina Hilding | WSU Insider

Due to its high porosity, concrete degrades when exposed to water and salt, leading to crumbling infrastructure. Professor Xianning Shi and graduate student Zhipeng Li of Washington State University created a novel concrete sealer by doping a commercial silicate-based sealer with two nanomaterials, graphene oxide, and montmorillonite nanoclay. These materials densified and protected the concrete to repel 75% more water than other commercial sealers.



Derived from WSU Insider

[Read More on the Journal of Materials in Civil Engineering](#)

Chemical synthesis yields potential antibiotic

Feb. 24, 2022 | MIT | ScienceDaily

Researchers at MIT have discovered a new way to synthesize himastatin, a natural compound produced by soil bacteria first reported in 1990s that possesses anticancer properties, as well as designed other variants of the molecule. The new approach is bio-inspired, involving a new dimerization

strategy that allows the researchers to bind different subunits together and create different variants of the compound. The different variants that can be synthesized could be explored for potential antibiotic properties.

[Read More on Science](#)

A possible paradigm shift within piezoelectricity

Feb. 18, 2022 | Technical University of Denmark | Phys.org

New findings from the Technical University of Denmark suggest piezoelectricity could be used in far more applications—including human cells. From watches to headphones, piezoelectric materials are ubiquitous in our daily lives. Piezoelectric materials have the property that they change shape when an electric voltage is applied to them. Alternatively, they create a voltage when they are physically struck. Most piezoelectric materials contain some heavy metals such as lead. However, these new findings show the possibility to make piezoelectric materials with environmentally friendly and biocompatible materials.



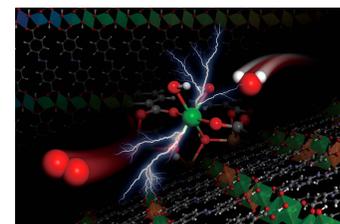
Photo Credit: Pixabay/CC0 Public Domain

[Read More on Science](#)

Entirely New, Inexpensive Catalyst Speeds the Production of Oxygen From Water

Feb 26, 2022 | David Chandler (MIT) | SciTechDaily

Oxygen evolution through electrolysis uses precious transition metals such as iridium oxide as catalysts. Research teams from MIT and other institutions developed a new type of catalyst material called metal hydroxide-organic framework (MHOF) that can match traditional catalysts in activity and stability. MHOF is synthesized by using aromatic carboxylate linkers to crosslink two-dimensional sheets of hydroxides. This type of material has better tunability than existing catalysts while being at least 100 times cheaper. The team is now looking into scaling up the testing and use of these materials. The findings can revolutionize the production of clean hydrogen by electrolysis.



Derived from SciTechDaily. Photo provided by the researchers

[Read More on Nature Materials](#)

Researchers create molecule that can pave way for mini-transistors

Feb. 15, 2022 | Lund University | ScienceDaily

Researchers at Lund University in Sweden have developed a hydrocarbon molecule—5,12-alkyne linked dibenzo[a,e]cyclooctatetraenes (dbCOTs)—that switches from insulating to conducting when exposed to an electric potential, similar to logic gates. This development opens a way to create molecular scale switches and electric machines, which operate faster and are more energy-efficient the smaller they are.

[Read More on Nature Communications](#)

PRISM Seminar

- Mar 16, 2022, 12:00 pm–1:00 pm ([Registration](#) Required)- "Mid-Infrared Nanophotonics for Sensing and Nanoscale Manipulation"
- Mar 30, 2022, 12:00 pm–1:00 pm - "Convective Self-Assembly of Colloidal Particles"

MSE Open House!



March 14, 2022

Materials Science and Engineering
Certificate Program **Open House**

Bowen Hall Lobby, 12:30-1:30PM

Interested in Materials Science? Please join us to learn more about the MSE Certificate Program. Faculty and current students will be available to talk about their experiences, classes, how to join the program and participate in activities.

Pizza lunch will be provided

Source: Sandra Lam

Registration opened for the 2022 MRS Exhibit!



Source: MRS

2022 PRISM Symposium (April 6-7) open for registration

Princeton Institute of Materials Symposium

An Incubator for Interdisciplinary
Science and Technology Innovation

Source: PRISM