

Materials Science and Engineering

FROM THE CHAIR / Spring 2024

Dear friends and colleagues,

Spring has arrived in Evanston, which is a time of reflection and celebration including the Hilliard Symposium, Materials Science and Engineering Awards Banquet, Northwestern Engineering Convocation, and Northwestern Commencement. We are excited to welcome many alumni, friends, and family to campus in the upcoming weeks, including **Grace Wang** (PhD '01) who will speak at the McCormick PhD Hooding and Master's Degree Recognition Ceremony.

The 41st Hilliard Symposium occurred on May 15, where we were honored to have **David Snydacker** (PhD '16) as our keynote speaker. David treated our department to an inspiring presentation on his company Liliac Solutions, which has raised more than \$200 million to develop, build, and operate ion exchange systems to increase production of lithium raw materials for the battery industry. The Hilliard Symposium also featured presentations from 14 senior graduate students, covering topics that span the interdisciplinary research portfolio of our department. Following the symposium, the festivities continued at the Materials Science and Engineering Awards Banquet, where we celebrated the many accomplishments of our students, faculty, and alumni, particularly the Distinguished Career Achievement Award for **Lyle Schwartz** ('59, PhD '64) and the Early Career Achievement Award for **Deep Jariwala** (PhD '15). Undergraduate student awardees included **Liam Warlick** (Hilliard Award for Research and Design), **Erin Bryan** (Hilliard Award for Leadership, Scholarship, Service), **Jaemin Yoo** (Outstanding Junior), **Bryan Villalpando-Hernandez** (Outstanding Sophomore), and **Mariana Lopez** (Meister Summer Research Award).

I am also pleased to highlight many other members of our department who have received major awards and recognitions over the past several months. **Ian McCue** and **Ryan Truby** received DARPA Young Faculty Awards, **Chad Mirkin** and **Teri Odom** were named Guggenheim Fellows, and **Carolyn Duran** was elected to the National Academy of Engineering. Our faculty were also named Fellows of major professional societies, such as **Amanda Petford-Long** (Materials Research Society), **James Rondinelli** (American Physical Society), and **Erik Luijten** (American Association for the Advancement of Science). Meanwhile, our students were recognized with several National Science Foundation Graduate Research Fellowships, including PhD students **Isabelle Behrman**, **Annie Gomez**, and **Elizabeth (Emmy) Markgraf**, fourth-year undergraduate students **Serafina France Tribe**, **Daniel Guo**, and **Liam Warlick**, and graduates **Caroline Harms** ('23) and **Davy Zeng** ('23).

Under the leadership of our department business administrator **Marilyn Hall**, our department office has seen significant improvements in operations and efficiency over the past academic year. Please join me in thanking all department staff for their hard work and tireless efforts, with special recognition to **Kanari Perry** (who was promoted from associate research administrator to research administrator) and **William Gomez Murcia** (who was promoted from financial assistant to financial coordinator).

Looking to the future, our department has undergone strategic planning over the past year in collaboration with our department advisory board and the McCormick School of Engineering. I encourage you to visit our department website to review our updated mission and vision statements. Our strategic plan provides a roadmap for future hiring, research directions, and curriculum development, which will be guided by our core values: *Cultivate Visionary Leaders and Trailblazers; Enable Scientific Discovery; Accelerate Engineering Innovation*. I look forward to updating you on our progress in the upcoming months and years.

In conclusion, I encourage you to explore the many exciting developments in our department in the newsletter below. If you have any feedback or suggestions, please feel free to reach out to me at your convenience. In the meantime, I wish everyone a relaxing and enjoyable summer.

Best regards,



Mark Hersam
Walter P. Murphy Professor and Chair
Department of Materials Science and Engineering
McCormick School of Engineering

Shape-Shifting Ultrasound Stickers Detect Post-surgical Complications



Developed by Professor **John Rogers**, the first-of-its-kind device 'tags' an organ to monitor abnormal, life-threatening fluid leaks.

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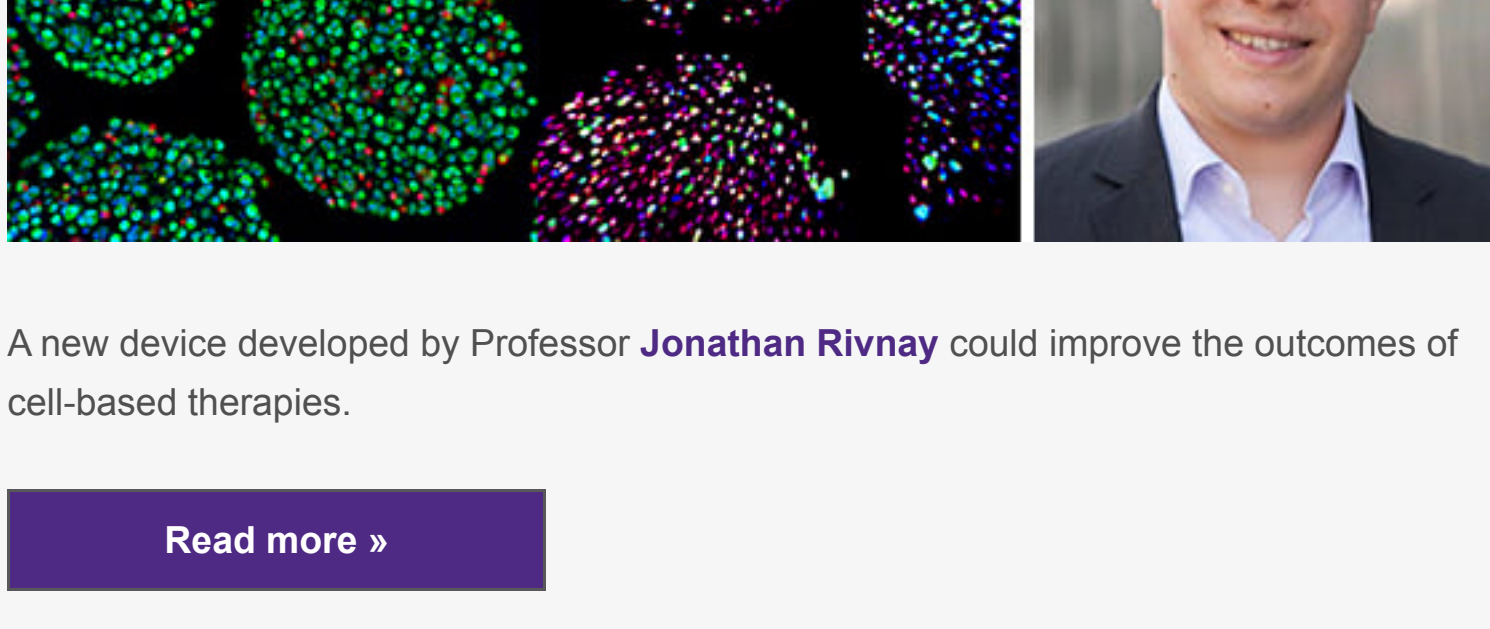
New Brain-like Transistor Mimics Human Intelligence



A transistor developed by Professor **Mark Hersam** performs energy-efficient associative learning at room temperature.

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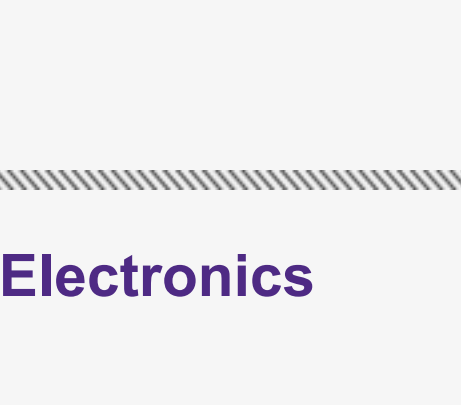
Once Again, Student Team Selected for NASA BIG Idea Challenge



Following up on its **2023 prize-winning effort**, the Northwestern team's proposal to explore expandable technology for lunar structures received \$146,420.85 in funding for the 2024 competition. **VIDEO**

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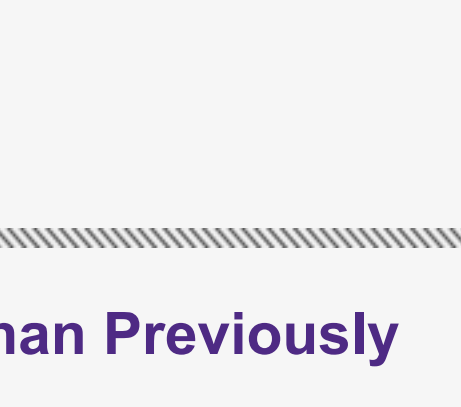
A Breath of Fresh Air Keeps Drug-Producing Cells Alive Longer



A new device developed by Professor **Jonathan Rivnay** could improve the outcomes of cell-based therapies.

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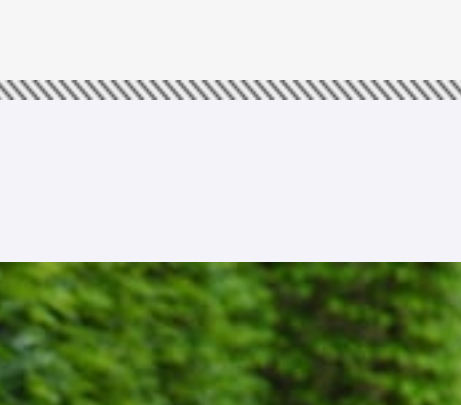
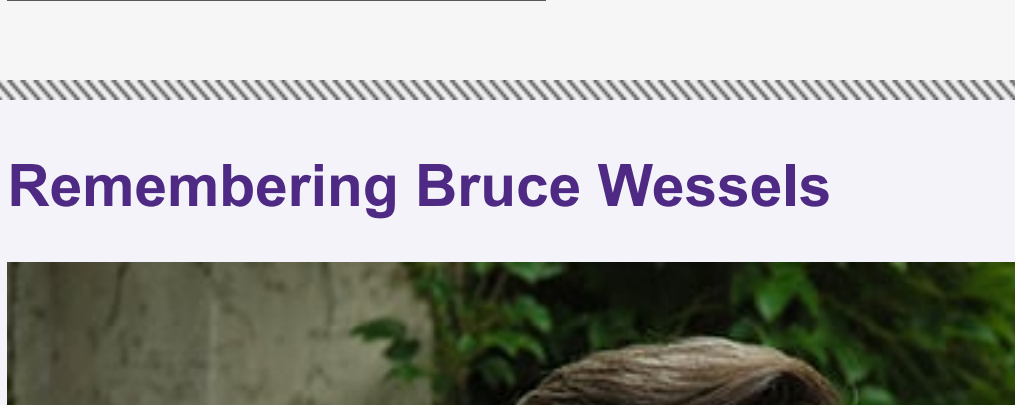
Pulling Carbon Dioxide Straight from the Air



Using humidity-powered technology, a team of researchers including Professor **Vinayak David** found several new ions that facilitate low-energy carbon sequestration.

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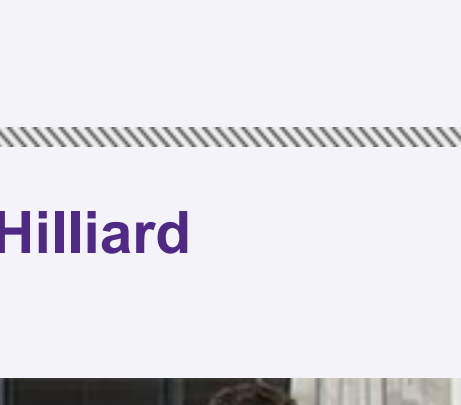
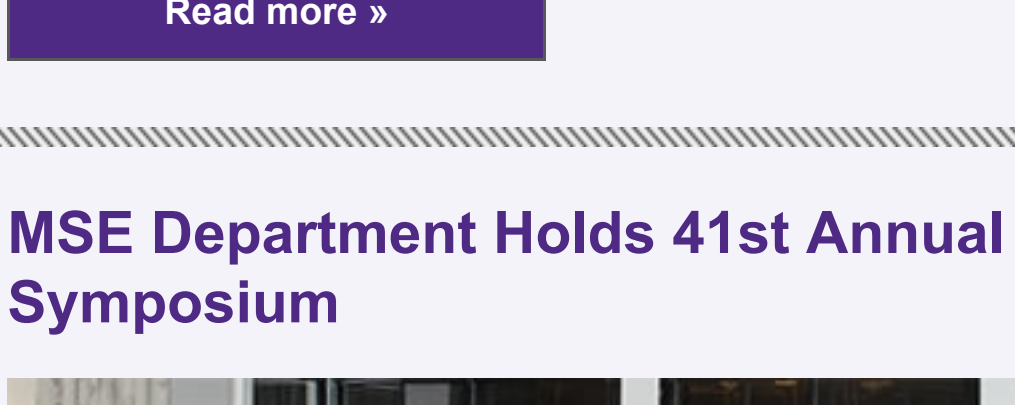
Accelerating the Use of Commercial Electronics Designed from Halides



Working with researchers from Kyoto University in Japan, Professor **James Rondinelli** discovered the first all-inorganic halide perovskite multiferroic material, exhibiting a unique form of ferroelectricity called hybrid improper ferroelectricity.

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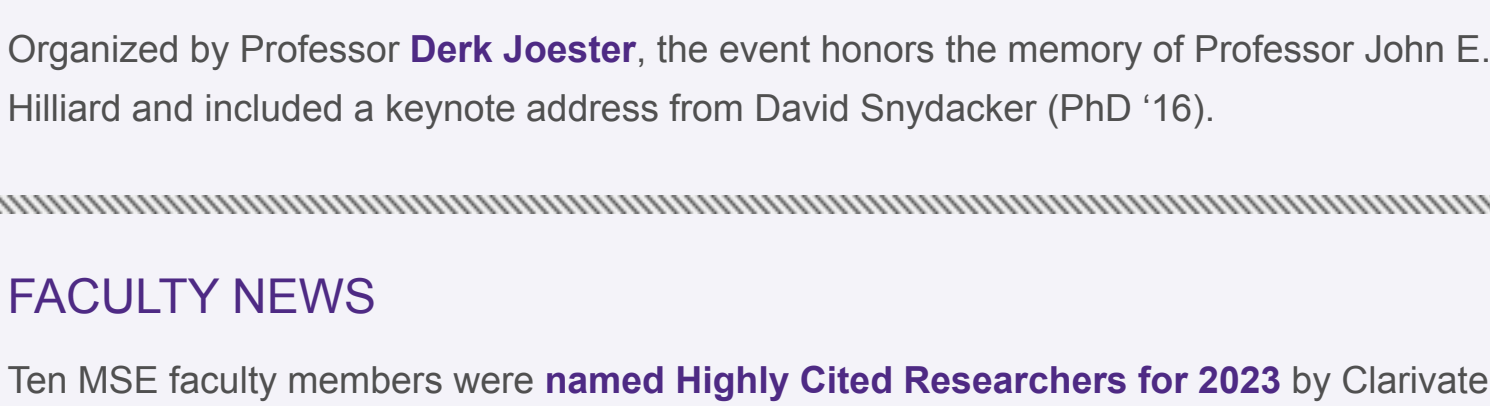
The Moon Is 40 Million Years Older than Previously Thought



Using atom-probe tomography, Research Associate Professor **Dieter Isheim** and Professor Emeritus **David Seidman** helped Field Museum researchers analyze lunar samples collected by Apollo 17 astronauts.

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Remembering Bruce Wessels



Professor Emeritus **Bruce Wessels**, who passed away April 7 at age 77, will be remembered for his notable contributions to the study of thin films and nanostructures and passion for service and scholarship.

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MSE Department Holds 41st Annual Hilliard Symposium



Organized by Professor **Derk Joester**, the event honors the memory of Professor John E. Hilliard and included a keynote address from David Snydacker (PhD '16).

FACULTY NEWS

Ten MSE faculty members were **named Highly Cited Researchers for 2023** by Clarivate Analytics: **Vinayak David**, **Mark Hersam**, **Yonggang Huang**, **Mercuri Kanatzidis**, **Tobin Marks**, **Chad Mirkin**, **John Rogers**, **Jonathan Rivnay**, **G. Jeffrey Snyder**, and **Chris Wolverton**.

Zdeněk Bažant received an honorary doctorate from UPPA, based in Pau, France, and the Arthur J. Boase Award from the American Concrete Institute.

Yip-Wah Chung received the Bunshah Award from the Advanced Surface Engineering Division of the American Vacuum Society and delivered an honorary lecture at the 50th anniversary of the International Conference on Metallurgical Coatings and Thin Films.

Mark Hersam and Adjunct Professor **Carolyn Duran** (PhD '98) were elected to **the National Academy of Engineering**. Hersam also earned the Materials Research Society's **Mid-Career Research Award**.

Denis Keane received the Gopal K. Shenoy Excellence in Beamline Science Award.

Erik Luijten was **named a 2023 Fellow** of the American Association for the Advancement of Science.

Tobin Marks received the Turner Alfrey Award in polymer chemistry.

Ian McCue and **Ryan Truby** were each **awarded Defense Advanced Research Projects Agency Young Faculty Awards**. Both are co-advising the 2024 NASA BIG Idea Challenge team finalists for "Inflatable Systems for Lunar Operations." McCue advised the team that **won the Systems Engineering Award** at NASA's 2023 BIG Idea Challenge Forum.

Chad Mirkin and **Teri Odom** were named **2024 Guggenheim Fellows**.

Amanda Petford-Long was elected a fellow of the Materials Research Society.

James Rondinelli was **elected a 2023 fellow** of the American Physical Society.

David Seidman was appointed as Senior Professor by Special Appointment in the faculty of engineering at Tel Aviv University.

G. Jeffrey Snyder earned **two awards for thermoelectrics research**: a Humboldt Research Award from the Alexander von Humboldt Foundation, and the International Thermoelectric Society's Outstanding Achievement in Thermoelectrics Award.

ALUMNI NEWS

Andrew Baluch (MS '04), now a partner at Smith Baluch LLP, returned to campus to present "Practical Tips for Strengthening Your Invention Disclosure: Laying the Cornerstone Patent for a University Startup Company." He also visited the ultrahigh vacuum scanning tunneling microscope still in operation in the Hersam lab that he helped build as a BS/MS student.

Lesley Chow (PhD '09), associate professor at Lehigh University, was awarded the Society for Biomaterials Mid-Career Award.

Andrea Hodge (PhD '02), Fluor Professor in Engineering and professor of chemical engineering and materials science and aerospace and mechanical Engineering at USC, was awarded the Ellen Swallow Richards Diversity Award from TMS.

Deep Jariwala (PhD '15) won the Lomb Medal, the oldest and most prestigious early career award in optics and photonics, and also won Northwestern MSE's 2024 Early Career Achievement Award.

Ashley Pas y Puente (PhD '16), materials science program chair and graduate director at the University of Cincinnati, was promoted to associate professor.

Lyle Schwartz ('59, PhD '64) received the 2024 Distinguished Career Achievement Award at the annual MSE Awards Banquet.

Peter Votruba-Drzal (PhD '02) was named vice president-elect, global sustainability, of PPG in January.

Grace Wang (PhD '01) **will speak at the McCormick PhD Hooding and Master's Degree Recognition Ceremony**. Wang is currently the president of the Worcester Polytechnic Institute.

STUDENT NEWS

NSF-GRFP fellowships were awarded to PhD students **Isabelle Behrman** (advised by Kenneth Shull), **Annie Gomez** (co-advised by Monica Olvera de la Cruz and Danielle Tullman-Ereck), **Elizabeth (Emmy) Markgraf** (advised by Ryan Truby); MSE fourth-year students **Serafina France Tribe**, **Daniel Guo**, and **Liam Warlick**; and graduates **Caroline Harms** ('23) and **Davy Zeng** ('23). Students recognized with NSF-GRFP honorable mentions included PhD students **Simona Fine**, **Heather Kurtz**, and **Albert Tsui**; and fourth-year students **Levi Hoogendoorn** and **Joshua Park**. **Caroline Harms** ('23) was also awarded the National Defense Science and Engineering Grant.

Undergraduate award winners were recognized at the annual MSE Awards Banquet on May 15: **Liam Warlick** won the Hilliard Award for Research and Design; **Erin Bryan** won the Hilliard Award for Leadership, Scholarship, Service; **Jaemin Yoo** was named Outstanding Junior, **Bryan Villalpando-Hernandez** was named Outstanding Sophomore, and **Mariana Lopez** received the Meister Summer Research Award.

Third-year students **Darrell Chen** and **Rohan Luthra** have been awarded DAAD-RISE fellowships for summer research in Germany.

Rosalba Huerta (advised by Jonathan Rivnay) and **Celeo Matute Diaz** (advised by Mark Hersam) were awarded GEM Fellowships.

Samatha Maness and **John Misiaszek** (both advised by David Dunand) were awarded Thinkswiss Research Scholarships.

Kelly Matuszewski (advised by Vinayak David) received a Hierarchical Materials Cluster Program fellowship.

Paty Meza (advised by Vinayak David) received the Microscopy and Microanalysis Student Scholar Award.

Ismael Coello Ramirez (advised by David Dunand) received the Army Research Laboratory Fellowship.

Roger Reinertsen (advised by Michael Bedzyk) received the American Physical Society Division of Soft Matter Poster Prize at the 2024 March Meeting.

Jacob Reinke (advised by Scott Barnett) won the Tel Aviv University Nanoscience and Nanotechnology Initiation Exchange Program Award.

Benjamin Shindel (advised by Vinayak David) was recognized with the American Chemical Society Award for Leadership in Mentoring.

Jaemin Yoo won the Korean-American Scientists and Engineers Association CHI Scholarship from the KSEA Chicago/Land Chapter.

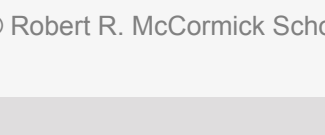
Duncan Zavanelli (advised by G. Jeffrey Snyder) was awarded a NASA Space Technology Research Opportunities Fellowship.

FACTS & FIGURES

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National Academy
memberships

10
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