

THE DEPARTMENT OF MATERIALS SCIENCE AND ENGINEERING PRESENTS THE
2018 JOHN E. DORN MEMORIAL LECTURE FEATURING:

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Beyond Li-Ion: From Solid State to Aqueous Electrochemical Energy Storage Batteries

While it is widely acknowledged that traditional Li-ion batteries - which work on the principle of reversible storage of electrons and Li-ions in bulk materials - are approaching their limits, the question is: what real opportunities lie beyond? This presentation will focus on the challenge to find better electrochemical energy storage systems that go “beyond Li-ion” batteries. I will discuss our recent findings in new solid-state ion conductors (Na, and Li) in the context of all-solid-state batteries, and aqueous multivalent intercalation batteries. These electrochemical energy storage systems both represent exciting new technologies that could meet the needs for high energy density and/or high power storage. Yet many barriers remain to realizing their full promise. They require cleverly designed materials for the electrodes, vastly different electrolyte strategies than those used for traditional Li-ion batteries and advanced electrode architectures. Guiding materials development also requires developing a fundamental understanding of the underlying chemistry of ion conduction in solids and across interfaces, which will be a focus of this lecture.

Tuesday, January 16 • 4 pm | Tech L211
Reception • 5 pm | Willens Wing Atrium

Linda Nazar, FRSC, is a Senior Canada Research Chair in Solid State Energy Materials and Distinguished Research Professor at the University of Waterloo, Waterloo Canada. She is a member of the Fellow of the Royal Society of Canada, and is an Officer of the Order of Canada. She is widely recognized for her pioneering work on energy storage materials with topics that span Li-S and Li-O₂ batteries; Li-ion, Na-ion, Mg-ion and Zn-ion batteries, solid state electrolytes, and the role that nanotechnology plays in energy materials science. Her work has earned her a place on the Web of Science’s 2014, 2016 and 2017 Highly Cited Researcher Lists.

Prof. Nazar received her B.Sc. in Chemistry from the University of British Columbia in Vancouver, Canada, and her Ph.D. in Chemistry from the University of Toronto. Following a postdoctoral appointment at the Exxon Research Labs in Annandale, N.J., she joined the faculty at the University of Waterloo, Waterloo Ontario Canada. Dr. Nazar is the recipient of several academic and professional honors and awards, including the Electrochemistry Society Battery Division Research Award (2009), the Rio Tinto Alcan Award for Electrochemistry (2010); the International Battery Association award (2011), the IUPAC Distinguished Women in Chemistry/Chemical Engineering award (2011), the August-Wilhelm-von-Hofman Lecture award (German Chemical Society, 2013), and the International Lithium Battery Association award (2017).



John E. Dorn (1909–71) was the most distinguished and well-known metallurgical alumnus of Northwestern University. In the late 1950s he helped his alma mater, which then had a very small materials science department, to receive Department of Defense funding to host one the nation’s first three Materials Research Centers. Both the center and the department were launched on a path to their present world-renowned stature.

Dorn was particularly famous for his work on the high-temperature creep of metals. He and his best-known student, Oleg Sherby, who went on to become a professor at Stanford University, established that the activation energy of high-temperature creep is the same as that of self-diffusion. Sherby was the first Dorn lecturer in 1974.

A Chicago native, Dorn received both BS (1931) and MS (1932) degrees in chemistry from Northwestern and a PhD (1936) in physical chemistry from the University of Minnesota. After a two-year postdoctoral fellowship at Battelle Memorial Institute in Columbus, Ohio, he became a faculty member at the University of California, Berkeley, where he spent the rest of his scientists at the time. He was known as an outstanding teacher as well as research scientist. Dorn authored or coauthored

180 research papers. His honors included the ASTM Charles Dudley Medal (1958), the ASM Howe Medal (1959), the ASTM Gillette Lectureship (1962), and the ASM Albert Easton White Distinguished Teacher Award (1964). He was elected a medallion member of the Honeur Société Francaise de Metallurgie in 1968. He received an honorary PhD from Northwestern in 1971.