

John E. Dorn Lecture: M. Stanley Whittingham

2019 Nobel Laureate

Distinguished Professor of Chemistry and Materials Science and Engineering
Binghamton University



The Lithium Ion Battery, from a Dream to Domination of Energy Storage – Future Materials Challenges

Lithium batteries have come from an idea in 1972 to dominate electrochemical energy storage today. They are now in a position to enable the large-scale introduction of renewable energy, as well as electrifying transportation, which will leave a cleaner and more sustainable environment for the next generation. There are ample scientific opportunities for materials scientists to further improve their performance, cost and safety. Today's cells attain only 25% of their theoretical energy densities, consume more than 50 kWh of power to make a 1 kWh battery, and use unsustainable and high cost components. As the energy density increases, safety tends to be compromised. Examples will include: the soft TiS_2 lattice, the layered oxides, $LiMO_2$, and Li_2VOPO_4 ; the last, a proof of concept for a two-electron transfer cathode. The opportunities and the technical challenges that need to be overcome will be described in order to open up a discussion.

M. Stanley Whittingham is a SUNY distinguished professor of chemistry and materials science and engineering at Binghamton and the 2019 Chemistry Nobel Laureate. He received his BA and D Phil degrees in chemistry from Oxford University, where he is an honorary Fellow of New College. He has been active in Li-batteries since 1971 when he won the Young Author Award of the Electrochemical Society for his work on beta-alumina. In 1972, he joined Exxon and discovered the role of intercalation in battery reactions, which resulted in the first commercial lithium rechargeable batteries that were built by Exxon Enterprises. In 1988 he returned to academia at SUNY Binghamton to initiate a program in materials chemistry. In 2018 he was elected a member of the National Academy of Engineering and received the Turnbull Award from MRS. He is a Fellow of the Royal Society, of MRS, ECS, ISE and ICDD. Presently his research addresses pushing lithium batteries to their limits and in assisting in creating an American lithium battery industry.

Tuesday, May 2 • 4 pm CT • Tech L211

In person only; no Zoom

Reception and Refreshments at 5:00 PM CT in Willens Wing Atrium of Tech (2nd floor between B and C wings). The whole MSE Community is welcome to attend!

Questions? Contact allison.macknick@northwestern.edu and megan.ray@northwestern.edu