

Seminar: Where are We Headed with Battery Technologies?

Presenter: Professor Arumugam Manthiram, Department of Mechanical Engineering & Director of the Texas Materials Institute, UT Austin

Location: Microelectronics and Engineering Research Center (MER 160), Room 2.114, 10100 Burnet Road, Austin TX 78758

Time: Friday, January 27, 2017, at 3:30 PM CDT.

Abstract: The mobile electronics revolution has been aided by high-energy density batteries for the past two decades, but the miniaturization or the energy density of batteries has not kept pace with the rapid advances in microelectronics. Following the success with mobile energy, rechargeable battery technologies are now intensively pursued for both electric vehicles and grid storage of electricity produced from renewable energy sources, such as solar and wind. The widespread adoption of batteries for vehicles and grid storage as well as increasing the user time between charges and decreasing the charging time for mobile electronics requires optimization of cost, cycle life, safety, energy density, power density, and environmental impact, all of which are directly linked to severe materials challenges. After providing a brief account of the current status of lithium-ion technology, this presentation will focus on the development of new materials, cell chemistry, and cell configurations for next-generation batteries. Particularly, the challenges and approaches of transitioning from the current insertion-compound electrodes in lithium-ion batteries to new conversion-reaction electrodes with multi-electron transfer to increase the energy density and lower the cost with earth-abundant elements like sulfur, oxygen, sodium, and zinc will be presented.



Arumugam Manthiram is currently the Cockrell Family Regents Chair in Engineering #7 and Director of the [Texas Materials Institute](#) and the Materials Science and Engineering Program at the University of Texas at Austin (UT-Austin). He received his Ph.D. degree in chemistry from the Indian Institute of Technology at Madras in 1981. After working as a postdoctoral researcher at the University of Oxford and at UT-Austin, he became a faculty member in the Department of Mechanical Engineering at UT-Austin in 1991. Dr. Manthiram's research is focused on clean energy technologies: rechargeable batteries, fuel cells, supercapacitors, and solar cells. He has authored 640 journal articles with 32,000 citations and an h-index of close to 100. He has graduated 51 Ph.D. students and 25 M.S. students and is currently directing a large research group with about 30 graduate students and postdoctoral fellows. He is the Regional (USA) Editor of Solid State Ionics and is on the editorial boards of 10 other journals. He is a Fellow of six leading professional societies: Materials Research Society, Electrochemical Society, American Ceramic Society, Royal Society of Chemistry, American Association for the Advancement of Science, and World Academy of Materials and Manufacturing Engineering. He received the Outstanding Graduate Teaching Award (one university-wide award per year) in 2012, the Battery Division Research Award from the Electrochemical Society in 2014, the Distinguished Alumnus Award of the Indian Institute of Technology Madras in 2015, and the Billy and Claude R. Hocott Distinguished Centennial Engineering Research Award in 2016.