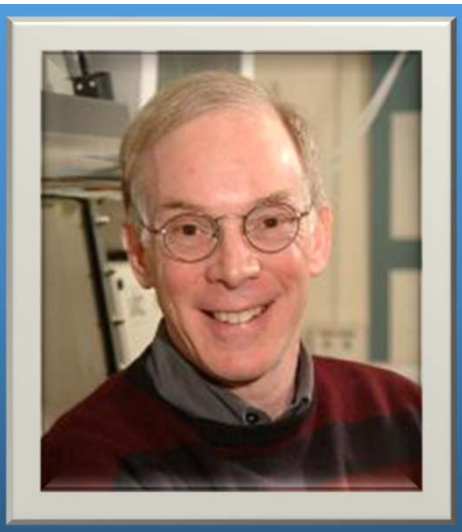
# Some New Directions in Solid Electrolytes

**[May 23, 2023 13:30-15:00, Lecture Rm 31]**




## Prof. Bruce Dunn

*Department of Materials Science and Engineering, University of California, Los Angeles,*
*Research Initiative for Supra-Materials, Shinshu University*



The great interest in solid state batteries has led to a wide range of studies of solid materials and while there has been significant progress in this field. For the most part, solid electrolytes are based on ceramic, it is always interesting to consider alternative approaches. This presentation will cover the synthesis and properties of two very different solid electrolytes, neither of which involve ceramic processing. In one case, we use sol-gel chemistry to create a pseudo-solid-state electrolyte in which an ionic liquid electrolyte is confined in a mesoporous inorganic matrix. This 'ionogel' leads to a material that possesses the electrochemical properties of the ionic liquid despite being a macroscopic solid. This presentation will emphasize our recent work on the electrochemical properties of Na-ion conducting ionogels. Our second approach is based on creating 'quasi-solid' electrolytes in which the photopatternable epoxy-based polymer matrix (SU-8) confines charge-carrying ions to provide ionic conductivity. By modifying the chemistry we have created a family of photopatternable solid electrolytes which exhibit $Li^+$ conductivity, $OH^-$ conductivity or systems which transport ionic liquids. The benefit of achieving photopatterning is the ability to incorporate solid electrolyte materials into photo-patterned micro supercapacitors used for electrochemical energy storage devices.


**Bruce Dunn** is the Nippon Sheet Glass Professor of Materials Science and Engineering at UCLA. His research interests concern the synthesis of inorganic and organic/inorganic materials, and the characterization of their electrical, optical, biological and electrochemical properties. He has published over 350 papers and has been awarded 22 patents with several pending. His recent work on electrochemical energy storage includes ionogels and pseudocapacitive energy storage materials. Among the honors he has received are a Fulbright research fellowship, the Orton Lectureship from the American Ceramic Society, named to the Web of Science list of Highly Cited Researchers, awards from the Department of Energy for outstanding research in materials science, and invited professorships at Shinshu University, the University of Paris, the University of Bordeaux, the University of Picardie (Jules Verne) and the Nanyang Technological University. In addition to serving on the Board of Reviewing Editors at *Science*, he is a member of the editorial boards of *Advanced Energy Materials, Solid State Ionics, Advanced Electronic Materials,* and *Journal of the American Ceramic Society.*


世話教員・お問い合わせ先：杉本　渉（繊維学部／先鋭材料研究所(RISM)）