Can Battery Materials Make Seawater Drinkable?

Expanding the Borders of Desalination Technology

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Kyle C. Smith, PhD: Smith's group at the University of Illinois utilizes computational modeling and experimental tools to develop technological solutions to societal problems at the intersection of energy and water by engineering, characterizing, and modeling transport phenomena and thermodynamics in electrochemical devices with flowing solution. Smith's recent work using Na-ion intercalation electrodes to desalinate water was among the top ten most read papers in the Journal of the Electrochemical Society for five months during 2016. For his published work in this domain Smith was awarded the 2018 ISE-Elsevier Prize for Applied Electrochemistry by the International Society of Electrochemistry (ISE). In addition, Smith's group is developing aqueous and non-aqueous redox flow batteries with long cycle life and novel electrolyte materials for grid energy storage using multi-scale modeling and experimental characterization. His group is also actively developing novel methods for the manufacturing of electrodes for Li-ion batteries and flow batteries.

Smith joined the University of Illinois in Fall 2014, before which he attended Purdue University and obtained Bachelor's and Ph.D. degrees in Mechanical Engineering in 2007 and 2012. His Ph.D. work focused on the influence of non-spherical particle shape on microstructure and transport processes in granular, heterogeneous materials with applications in H_2 and energy storage. During this time he was named a National Science Foundation Graduate Research Fellow, Purdue Chappelle Fellow, and Lambert Teaching Fellow. Prior to joining the University of Illinois Smith was a Post-Doc at the Massachusetts Institute of Technology, where he modeled and analyzed the electrode-scale transport processes occurring in suspension-based flow batteries using intercalation reactions.