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Biography

Steven Boles received BS degree in Materials Science and Engineering from Carnegie Mellon University in 2004, and Ph.D. degree in Materials Science and Engineering from the Massachusetts Institute of Technology in 2010. He is currently an assistant professor in the Department of Electrical Engineering at the Hong Kong Polytechnic University. His research interests cover the characterization and development of advanced electronic materials for a variety of energy-focused applications.

In Situ Nanomechanical Investigations of Semiconductor Nanowires for Smart Material and Energy Storage Applications

Nanowires are often considered to be a core component for the next generation of electronic devices. However, the unique geometry and size-scale of nanowires makes them particularly attractive for discovering and exploring fundamental material properties which are not exclusively inherent to nanowires, but rather are also exhibited in micro- and bulk-specimens. In this work, silicon and other semiconductor nanowires are used a platform for in situ nanomechanical investigations of energy-related materials and applications. The testing of nanowires with our platform can be used to determine their basic mechanical properties, such as elastic modulus, fracture strength and creep behavior. Coupled electro-mechanical testing of nanowires can also be employed to confirm stress-induced phase changes in correlated electron materials. Lastly, new investigations and research directions based on the testing platform and methods previously described will be presented.