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Carbon nanomaterials/polymers nanocomposites and electrochemical energy storage

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With the rapid developments in the markets of portable electronics and electric/hybrid vehicle, efficient energy storage and conversion materials with high power, high energy and long life span are urgently needed. Rational design of polymer composites is an effective approach to develop high-performance energy materials. With the unique structures and outstanding physical and chemical properties, carbon nanomaterials including graphene and carbon nanotubes are the ideal candidates for energy storage and conversion materials. In our research, we focus on the fundamental issues such as the surface modification of carbon nanomaterials, the manipulation of multi-scaled structures of the composites as well as the relationship between the structures of the composites and the performance of the energy storage and conversion devices. In our recent research, we proposed a facile *in situ* method for preparing three-dimensional porous graphitic carbon composites containing sulphur nanoparticles (3D S@PGC) with sulphur content up to 90 wt%. Because of the high sulphur content, the nanoscale distribution of the sulphur particles and the covalent bonding between the sulphur nanoparticles and the PGC, the 3D S@PGC cathodes exhibit high specific capacity (1382, 1242, 1115 mA h g⁻¹ at 0.5, 1, 2 C, respectively), long cycling life (a small capacity decay of 0.039% per cycle over 1000 cycles at 2 C), excellent rate capability at a high charge/discharge current.

Biography

Jianxin Geng received his PhD from Changchun Institute of Applied Chemistry, Chinese Academy of Sciences (CAS), in 2004. After graduation, he joined Beijing University of Chemical Technology as a Lecturer. From 2005 to 2011, he worked as Postdoc and Research Assistant Professor at Korea Advanced Institute of Science and Technology, Western Kentucky University and the University of Texas at Austin. In 2011, he joined Technical Institute of Physics and Chemistry, CAS, as Associate Professor and promoted to Professor one year later. In 2018, he joined College of Energy at Beijing University of Chemical Technology. He has more than 70 peer-viewed papers published in highly prestigious journals such as *Nature Communications*, *Journal of the American Chemical Society*, *Angewandte Chemie International Edition* and *Chemical Science*. His research interests include carbon nanomaterials, polymer science and electrochemical energy storage.

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