Materials Panel Abstract & Speaker Biography

Sulfur Nanoparticles Coated with Polyelectrolyte Nanomembranes for Sulfur Cathode

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Elemental sulfur is the very attractive cathode for the post Li ion battery since the sulfur has high theoretical capacity of 1672 mAh/g[1]). Despite these attractive properties, practical application of Li-S battery is still unrealized by some big challenges on a sulfur cathode such as high resistance, low loading of active material and dissolution of the intermediate polysulfide into the electrolyte during charge and discharge. These issues cause low columbic efficiency, fast capacity fade and self-discharge of the Li-S battery. In order to suppress the dissolution of the intermediate polysulfides and minimize the addition of conductive carbon[2]); our group has created a controlled nanoarchitecture template in which sulfur nanoparticles encapsulated with the conductive polyelectrolyte nanomembranes coated with nanocarbon similar to "chocolate hazelnut truffle"[3]) (figure 1). The findings of this work will be discussed.

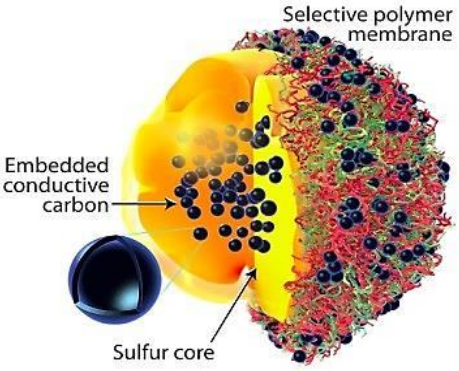

Figure 1. A three-dimensional view of our concept depicting the carbon infused sulfur core, the hollow carbon nanoparticles and multilayer selective polymer membrane decorated with functionalized carbon.

References

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Speaker Biography:

Dr. John Muldoon received his B.Sc (Hons) in chemistry from Queens University of Belfast. He completed his Ph.D at University of Notre Dame under the direction of Prof. Brown studying air oxidation of organics using terminal oxo complexes of late transition metals. He worked as research associate at The Scripps Research Institute under Prof. Sharpless (Nobel laureate in Chemistry 2001) and Prof. Fokin, developing applications of click chemistry including *in situ* click chemistry to discover HIV protease inhibitors and acceleration for chemical reactions on water.

He is currently a senior principal scientist at Toyota Research Institute of North America. His research interests include future energy solutions such as multivalent batteries, lithium/sulfur batteries, Li ion batteries and fuel cells. He has numerous patents in the area of new battery chemistry and fuel cell.