Abstract Submitted
for the MAR15 Meeting of
The American Physical Society

Carbon composites with metal nanoparticles for Alcohol fuel cells

LAKSHMAN VENTRAPRAGADA, Clemson University, R.S. SIDDHARDHA, Sri Sathya Sai Institute of Higher Learning, RAMAKRISHNA PODILLA, Clemson University, V.S. MUTHUKUMAR, Sri Sathya Sai Institute of Higher Learning, STEPHEN CREAGER, A.M. RAO, Clemson University, SAI SATHISH RAMAMURTHY, Sri Sathya Sai Institute of Higher Learning — Graphene due to its high surface area and superior conductivity has attracted wide attention from both industrial and scientific communities. We chose graphene as a substrate for metal nanoparticle deposition for fuel cell applications. There are many chemical routes for fabrication of metal-graphene composites, but they have an inherent disadvantage of low performance due to the usage of surfactants, that adsorb on their surface. Here we present a design for one pot synthesis of gold nanoparticles and simultaneous deposition on graphene with laser ablation of gold strip and functionalized graphene. In this process there are two natural advantages, the nanoparticles are synthesized without any surfactants, therefore they are pristine and subsequent impregnation on graphene is linker free. These materials are well characterized with electron microscopy to find their morphology and spectroscopic techniques like Raman, UV-Vis. for functionality. This gold nanoparticle decorated graphene composite has been tested for its electrocatalytic oxidation of alcohols for alkaline fuel cell applications. An electrode made of this composite showed good stability for more than 200 cycles of operation and reported a low onset potential of 100 mV more negative, an important factor for direct ethanol fuel cells.

Lakshman Ventrapragada
Clemson Univ

Date submitted: 14 Nov 2014 Electronic form version 1.4