

Porous Carbon Nanoparticles Co-Doped with Nitrogen and Iron as an Efficient Catalyst for Oxygen Reduction Reaction

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Abstract : Oxygen reduction reaction (ORR) performance of iron and nitrogen co-doped porous carbon nanoparticles (Fe-NPC) with various physical and (electro) chemical properties have been investigated. Fe-NPC nanoparticles are synthesized via a facile soft-templating procedure by using Iron (III) chloride hexa-hydrate as iron precursor and aminophenol-formaldehyde resin as both carbon and nitrogen precursor. Fe-NPC nanoparticles shows high surface area (443.83 m²g⁻¹), high pore volume (0.52 m³g⁻¹), narrow mesopore size distribution (ca. 3.8 nm), high conductivity (IG/ID=1.04), high kinetic limiting current (11.71 mAcm⁻²) and more positive onset potential (-0.106 V) compared to metal-free NPC nanoparticles (-0.295V) which make it high efficient ORR metal-free catalysts in alkaline solution. This study may pave the way of feasibly designing iron and nitrogen containing carbon materials (Fe-N-C) for highly efficient oxygen reduction electro-catalysis.

Keywords : electro-catalyst, mesopore structure, oxygen reduction reaction, soft-temple

Conference Title : ICN 2015 : International Conference on Nanotechnology

Conference Location : Amsterdam, Netherlands

Conference Dates : August 06-07, 2015