Iron coordinating N-doped carbon nanotube electrocatalysts for oxygen reduction reaction in a fuel cell system

노우영, 이재성†
UNIST
(jslee@unist.ac.kr†)

It is extremely desirable but challenging to develop highly active, stable, and low-cost electrocatalytsts for oxygen reduction reaction (ORR) to replace Pt-based electrocatalysts in order to perform the commercialization of fuel cells. Here, we suggest a novel iron-coordinating nitrogen doped-carbon nanotubes (Fe/N-CNT) synthesized by a simple two-step process. In the hydrothermal process, iron phthalocyanine (FePc) is uniformly dispersed and anchored on oxidized multiwalled carbon nanotubes (Ox-MWCNTs) surface with the assist of Π-Π stacking and oxygen-containing functional groups. Then, as-prepared FePc/N-CNT suspension was annealed in NH3 atmosphere and lyophilized. The Π-Π interactions during hydrothermal process between FePc and Ox-MWCNTs are capable of forming stable and 3 dimensional structured Fe/N-CNT electrocatalysts in the annealing step. Such interactions finally lead to a synergistic effect toward Fe-N-C active sites for ORR performance. In addition, high surface area and excellent charge transport properties of CNT materials could help FexN/ N-G-CNT composite electrocatalysts to exhibit good ORR performance.