

Development of N-doped Mesoporous Graphitized Carbon for Enhanced Stability in Polymer Electrolyte Membrane Fuel Cells

정원석[†]
환경대학교
(jungw@hknu.ac.kr[†])

Polymer electrolyte membrane fuel cells (PEMFCs) are promising zero-emission power sources for portable, automotive and stationary applications, since unique advantages such as high energy density and efficiency. However, there are still some obstacles to break through before commercialization (i. e.: the sluggish kinetic and poor durability of the cathode catalysts). Currently, Pt is known as the best catalyst of the pure metals for the oxygen reduction reaction (ORR). However, the durability of Pt catalyst is poor since the dissolution of the Pt catalyst, particle agglomeration, and migration of Pt. We synthesize a mesoporous graphitic carbon doped with nitrogen (NMGC) through the pyrolysis process using TM-chelate complex. In the accelerated stress test suggested by U.S. DOE (0.6 - 1.0 V, 30000 cycles), Pt/NMGC-Fe catalyst showed highly stable performance as compared to the Pt/C catalyst. The electrochemical surface area (ECSA) of Pt/NMGC-Fe catalyst remained about 30% of initial ECSA, while about 10% of initial ECSA was remained for the commercial Pt/C catalyst.