Synthesis and characterization of 1D nanostructured materials for electrocatalytic reactions

김영민, 김형주, 채호정, 김원배[1,†]
한국화학연구원; [1]광주과학기술원
(wbkim@gist.ac.kr†)

In this work, one-dimensional nanostructured materials of metal or metal oxide composites have been synthesized and characterized as electrocatalysts for energy conversion systmes such as fuel cells and lithium-oxygen batteries. PtAu nanotubes were prepared via a galvanic replacement process using sacrificial Ag templates for formic acid electrooxidation, showing improved catalytic activities over the monometallic Pt catalysts due to structural and compositional effects. Also, PtAg nanotubes were prepared for the electrocatalytic oxidation of ethylene glycol and glycerol in alkaline media, demonstrating enhanced electrocatalytic performance compared with Pt nanotubes and commercial Pt catalysts. Then, for use as catalysts in Li-O2 batteries, RuO2/Co3O4 composite nanofibers were synthesized via an electrospinning method, exhibiting superior bifunctional electrocatalytic activities for both the oxygen reduction and evolution reactions. The use of 1D nanostructured materials has provided the opportunity to achieve improved electrocatalytic performance of the catalysts under the reaction conditions of fuel cell and Li-O2 battery.