Modification of carbon support to improve catalyst utilization for DMFC

박찬희, 이재영, Scibioh M. Aulice, 오인환, 홍성안, 하흥용*
KIST 연료전지센타
(hyha@kist.re.kr*)

Carbon supported and unsupported Pt-Ru alloys are currently considered as the best electrocatalysts for methanol oxidation in direct methanol fuel cells (DMFCs). Significant efforts have been made to find appropriate synthesis procedure for production of these catalysts with suitable dispersions. Major attempts were focused on lowering the amount of catalyst loading in the electrodes. The platinum utilization even in the best performing electrodes remained very low (10-25%). The main requirement of a good electrode is a three-phase boundary, between the supply of reactants on one hand and the catalyst particle and the ionic conductor on the other hand. In this work, the carbon supported Pt-Ru catalyst was prepared by using a modified carbon fine powder as support to extent the reaction area of three-phase boundary and to increase the utilization of catalyst particulates. The prepared catalysts were characterized by using BET surface area and pore size distribution measurements, XRD, TEM, SEM, CV techniques and DMFC single cell tests. Compared to commercial catalysts, the home-made 40 wt.% Pt-Ru supported on modified carbon support exhibited the highest cell performance in DMFC. The results will be discussed in the light of comprehensive data.