Synthesis and Characterization of Tungsten Carbide Microspheres as a Electrocatalyst for Methanol Oxidation

함동진, 한승현, 배강홍, 이재성*
포항공과대학교 화학공학과
(jlee@postech.ac.kr*)

There have been several attempts to utilize tungsten carbide as an electrocatalyst for methanol oxidation because of its platinum-like catalytic behavior, its stability in acid solutions at anodic potentials, and its resistance to CO poisoning. In this study, W_2C microspheres were synthesized by heating mixtures of RF polymer (a carbon precursor) and AMT (a tungsten precursor). Platinum loaded W_2C microspheres were synthesized by conventional borohydride reduction method. The charaterizations of AMT/RF polymer intermediate and W_2C, Pt/W_2C microspheres were analyzed by In-situ IR, STA, XRD, FE-SEM, HRTEM, TPD and Cyclic voltammetry. The BET surface area of the W_2C microspheres is about $176m^2g^{-1}$, and the CO uptake value is $956\mu molg^{-1}$. 7.5wt% Pt/W_2C particle size is about 6nm by Debye-Scherrer equation. Especially, the electrochemical surface area of Pt/W_2C is several times higher than commercial catalyst (E-Tech). The mass activity of Pt ($mAmg^{-1}$ of Pt taken at 0.75V) supported on W_2C microspheres (7.5wt%) for methanol oxidation is higher by factors of 2.4 than commercial catalyst (E-Tech).