

Ultra-low Pt content anode catalyst prepared by electrochemical processes for a DFAFC

엄성현^{1,2}, 권영국², 정성택¹, 이재영^{2,*}
¹인하대학교; ²광주과학기술원
(jaeyoung@gist.ac.kr*)

The electrodeposition of platinum (Pt) catalyst directly on the electrochemically pretreated carbon paper substrate as catalyst support was conducted to not only improve catalyst utilization but also secure electronic percolation network toward formic acid fuel cell application. The nanostructured Pt catalysts were obtained by potentiostatic or galvanostatic deposition and characterized by SEM, XRD, XPS and EDX analysis. Good selection of adequate carbon paper as catalyst support was prerequisite to form more favorable catalyst layer of membrane electrode assembly (MEA). Furthermore, for more enhanced catalytic activity of formic acid electro-oxidation, Bi adatom was under-potential deposited on as-prepared Pt electrode with ca. 30% surface coverage. Polarization measurement with PtBi_{upd} catalyst of 0.5 mg/cm² shows superior power performance and stability to commercially available PtRu or Pt black catalyst with higher metal loading (i.e., at least 3 mg/cm²) over entire current range in addition to enhanced open circuit potential.

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