Enhanced electrocatalytic effect of Bi incorporated nano-carbon synthesized by polyol process toward Cr^{2+}/Cr^{3+} and Fe^{2+}/Fe^{3+} redox reaction for Fe-Cr RFB

수하르토유스티안, 김기재[1], 권용재[1,†]
서울과학기술대학교; [1]서울과학기술대학교 신에너지공학과
(kwony@seoultech.ac.kr†)

The newly synthesized Bismuth (Bi) incorporated nano-porous carbon is proposed as a promising electrocatalyst for Fe-Cr redox flow batteries (ICRFB). By the modified polyol method, Bi can be successfully incorporated into nano-porous carbon framework. The proposed Bi-based catalyst demonstrates excellent electrochemical reactions toward Fe2+/Fe3+ and Cr2+/Cr3+ redox reactions owing to the outstanding catalytic effect of polyol Bi. Furthermore, polyol Bi also capable to mitigate hydrogen evolution, as Bi has a high overpotential towards hydrogen evolution. In addition, ICRFB cell employing carbon felt electrode with Bi-based catalyst exhibits high energy efficiency of 78%, which is approximately 9% higher than that of ICRFB cell employing carbon felt electrode without Bi-based catalyst. Such improvement is mainly attributed to the superior electrocatalytic effect of polyol Bi acting as active sites for Fe(II)/Fe(III) and Cr(II)/Cr(III) redox reactions. Therefore, the polyol Bi presents considerable potential as a good electrode catalysts for ICRFB application.