Cu^0-Cu^+ Interfaces Maximized Cu/Cu_2O Aerogel for Electrosynthesis of Ethanol from Carbon Dioxide

김찬솔, 조경민, 정희태†
KAIST
(heetae@kaist.ac.kr†)

Electrocatalytic CO_2 conversion to useful liquid fuels is the most promising technology for solution of energy crisis and environment. Copper is the only metal to synthesis C_{2+} product due to its moderate binding energy with intermediates. However, faradaic efficiency (FE) and production rate has been limited by competing hydrogen evolution and C_1 production with small active area. Herein, Cu/Cu_2O aerogel for highly efficient ethanol electrosynthesis is proposed which shows FE and partial current density to ethanol of 40% and 31.2 mA/cm^2. This values are the highest compared to all other previous reports. Maximized Cu^0-Cu^+ interfaces facilitated CO_2 activation and C-C dimerization which derived enhancement of ethanol selectivity. At the same time, large surface area of porous aerogel with confined structure was crucial for dramatic increase of ethanol productivity. We also applied this efficient electrocatalyst on flow cell reactor as a gas diffusion electrode. Therefore, our novel electrocatalyst is an appealing model for efficient and commercializable electrosynthesis of ehtanol from CO_2