Enhanced Electrochemical Reduction of CO₂ to Ethylene on Electrodeposited Copper in 0.1 M KHCO₃

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Copper dendritic structures with low porosity were prepared via electrodeposition under acid-free conditions. The microstructure (morphology and facet selectivity) could be tuned by altering the electrodeposition potential and time length. In contrast to previous electrodeposited copper under acidic conditions, the present copper electrodes led to enhanced formation of ethylene relative to polycrystalline copper for electrochemical reduction of carbon dioxide. The synergy of the non-porous dendritic structures and the increased content of exposed high-index crystal facet (311) may account for this improvement.

Keywords: CO₂ reduction; electrocatalysis; copper dendrites; electrodeposition; faradaic efficiency

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