

All-water-based solution processed Ag nanofilms for highly efficient electrocatalytic reduction of CO₂ to CO

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Electrochemical reduction for conversion of CO₂ to value-added chemicals is considered a promising method to relieve global warming. To develop a highly active and selective electrocatalyst for efficient CO₂ conversion, it is essential to overcome the large overpotential and to suppress the competitive hydrogen evolution reaction (HER). Herein, we report a simple and controllable fabrication method for Ag electrocatalytic films using all-water-based solution processes via a seed-mediated metal growth technique. Varying the deposition conditions allows the N/S doping ratio in Ag films with high coverage and good adhesion to be easily controlled in the range of 1.14–8.23. The doping ratio has a significant effect on the CO Faradaic efficiency (FE), as the S content modulates the binding energy of reaction intermediates, whereas the N content is effective for suppressing the HER on the Ag film surface.