Carbon Dioxide Reduction Reaction performance of Co-Cluster-Decorated CoOx@Pd Nanocatalysts by thermal reduction

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Abstract

In recent years, the conversion of CO_2 into fuels and chemicals through catalyst has been receiving high attention, because its products are not only useful as substitutes for fossil raw materials, but also beneficial for large-scale CO_2 conversion and closed carbon recycling. In this study, we controlled the adsorption of metal ions in sequence, and then via wet chemical reduction on activated carbon supports to synthesize cobalt-palladium binary metal nanocatalysts. Conducting CO_2 hydrogenation reaction in a low temperature environment (from 323K to 573K) in order to reduce CO_2 thermally into C_1 products (such as CO, CH_4). Through X-ray diffraction analysis, cyclic voltammetry and CO-stripping to analyze the physical structure and surface chemical characteristics of the samples. Eventually, calculate the amount of production yield by the GC gas chromatograph, with 0.8wt% cobalt clusters decoration, the sample gains an optimum production yield of 3.33 mmol g^{-1} of CO at 573K. Such a better yield is due to the local synergy between CO chemisorption and H_2 splitting at the binary metal interface to achieve better CO_2 conversion efficiency.

Keywords – CO_2RR, gas chromatograph, CO_2 hydrogenation