ELECTRONIC STRUCTURE TUNING IN CO_2 ELECTROCATALYTIC REDUCTION

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Abstract— In terms of the CO_2 electroreduction reaction, the electronic structure of catalysts is extremely related to the activity. Pd has been widely investigated in CO_2 electroreduction to CO due to its facile modification of structure and size. However, the relatively high hydrogen evolution reaction (HER) activity of Pd and strong CO binding to Pd surface severely retards its improvement of activity, selectivity and durability in CO_2 electroreduction reaction (CO_2RR). In light of these issues, we tuned the electronic structure of Pd through alloying and loading low concentration metal pair atoms catalysts on the surface of Pd to modify its CO_2 adsorption behavior and CO desorption property. The electrochemical measurements show that the changes of Pd in electronic structure significantly enhance the CO_2 reduction selectivity and stability, and further inhibit competing HER on Pd. Our researches provide important guidance for designing highly efficient electrocatalysts in CO_2RR.

Key words—Electronic structure, CO_2 electroreduction, high CO selectivity, facile CO desorption, perfect stability.