Revealing Charge Transfer at the Interface of Cobalt Oxide and Ceria during CO Oxidation

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Cobalt oxide (Co_3O_4) is a promising catalytic material for CO oxidation. When CeO_2 is deposited on Co_3O_4, the reaction rate is improved due to the superior oxygen supply of CeO_2. To understand the role of the CeO_2-Co_3O_4 interface, we designed novel CeO_2-deposited Co_3O_4 nanocubes (NCs) with controlled CeO_2 layers. By selective deposition of CeO_2 to Co_3O_4 NCs by varying surfactant concentration and pH, Co_3O_4 NCs covered with 1-, 3-, and 6 faces of CeO_2 layers (CoCe-1F, CoCe-3F, and CoCe-6F) were prepared. Various *in situ* characterization studies reveal that the deposited CeO_2 supplies oxygen to the Co_3O_4 surface, preventing Co_3O_4 from being easily reduced. CoCe-3F with a maximum Co_3O_4/CeO_2 active interface exhibits the best CO oxidation rate due to the flexible change of the oxidation state at the interface. In this study, the reaction mechanism is clearly understood by investigating the changes in the oxidation state during the CO oxidation reaction at the Co_3O_4/CeO_2 interface.