Preferential Oxidation of Carbon Monoxide in Excess Hydrogen Over Cu-Co Oxides with mesoporous structures

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Catalytic preferential oxidation (PROX) of CO in a H_2-rich stream has recently attracted much attention, since it is considered as the simplest and the most effective method for CO removing from the gas mixtures containing concentrated H_2 for fuel cells. In this study, a series of mesoporous Cu-Co composite oxides by a co-nanocasting-replication method using mesoporous silica KIT-6 as hard template which with the different Cu/Co ratios. The obtained materials were well-characterized by XRD, N_2-adsorption, SEM, TEM, XPS, H_2-TPR and CO-TPD. The results indicated that these Cu/Co composite oxides with different ratios show the smaller particle sizes than pure CuO and Co_3O_4. And these composite oxides can be reduced at lower temperatures than Co_3O_4 by H_2. CO adsorption amounts over the composite oxides were significantly higher than those over Co_3O_4 and CuO. It is indicated that a strong interaction between Cu and Co species in these composite oxides and when the Cu/Co=1 atomic ratio at which the $Cu_3Co_{3-x}O_4$ phase was the main component. For the preferential oxidation of CO in H_2-Rich stream, the ratio of composite oxides is 5:5 showed the best catalytic activity than both Cu oxide and Co oxide and other composite oxides.