Co-precipitated Cobalt Spinel Based Catalysts with Potassium Doping for N_2O Decomposition

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N_2O has a high global warming potential (GWP) which is 310 times higher than that of CO_2. Therefore it is required to abate N_2O in aerosphere. It is reported that Co_3O_4 is active for direct N_2O decomposition owing to its relatively high redox properties, and oxygen storage capacity (OSC) of ceria (CeO_2) improves thermal stability. Cobalt spinel, however, which was prepared by precipitation was significantly inhibited by O_2, H_2O at low temperature (<400℃). To improve catalytic activity at low temperature (<400°C), researchers added alkali and alkaline earth metals on cobalt spinel. This study investigated cobalt spinel based catalysts prepared by a co-precipitation and incipient wetness impregnation method. These catalysts especially doped potassium showed high activities in the presence of O_2 and H_2O. The activity of potassium doped catalysts exhibited significantly improved catalytic performance while the activity of CeO_2 combined Co_3O_4 was slightly higher than that of Co_3O_4 at the low temperatures (< 400°C). To demonstrate the relationship between catalytic performance and redox ability, the prepared catalysts were characterized by XRD, BET, H_2-TPR, O_2-TPD and XPS.