$MgCeO_x$-supported copper as a highly effective material for low-concentration carbon monoxide adsorption for high-purity H_2 production

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This study developed a highly effective copper-based adsorbent for low-concentration carbon monoxide (CO) removal in highly-purified hydrogen gas. Hydrogen (H_2) is getting attention as a next-generation carrier of energy, and thus, H_2 fuel cell technology using a solid polymer electrolyte membrane (PEMFC) is widely developed. Since catalysts in PEMFC is even vulnerable to low concentration of CO (0.5% ~ 1%) in purified H_2 gas, an effective way to reduce CO concentration to 0.2 ppm level is essential.

In this study, CO adsorption experiments were conducted on $Cu/MgCeO_x$. The developed sorbent, consisting of Cu, MgO, CeO_2, was synthesized via the sol-gel combustion method. The adsorbents exhibited a highly porous structure as well as high Cu dispersion for efficiently removing a dilute CO in mixtures. The adsorption experiments were conducted at 298K, and excellent CO removal performance could be achieved in the ultra-low pressure environment. The CO adsorption capacity of $Cu/MgCeO_x$ at 298K under 1000 ppm was marked nearly 50 times higher compared to the commercial activated carbon.