Synthesis of Highly Ordered Mesoporous Silver Catalyst and Pre-treatment Effect on CO Oxidation

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Highly ordered mesoporous silver material was successfully synthesized from a mesoporous silica template (KIT-6) with 3-d channel structure using the nano-replication method. The effects of H_2 or O_2 pretreatments on the catalytic performance of the mesoporous silver were investigated using a temperature programmed CO oxidation technique in a fixed bed reactor. The mesoporous silver material that was pretreated with H_2 exhibited an excellent catalytic activity compared to the as-prepared and O_2-treated catalysts. For the CO oxidation, the apparent activation energy of the H_2-treated mesoporous silver catalyst was 61 +/- 0.5 kJ mol^{-1}, which was also much lower than the as-prepared (132 +/- 1.5 kJ mol^{-1}) and O_2-treated catalysts (124 +/- 1.4 kJ mol^{-1}). Moreover, this present mesoporous silver material showed good catalytic stability.