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# Highly reproducible syntheses of active Au/TiO<sub>2</sub> catalysts for CO oxidation by deposition–precipitation or impregnation

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## Abstract

Gold catalysts supported on TiO<sub>2</sub> were prepared by a deposition–precipitation (DP) method to investigate how highly reproducible performance of the gold catalysts in CO oxidation can be achieved. A protocol was established for synthesizing identically performing catalysts by different operators. The results show that for this synthesis route, the calcination step is not needed to form highly active Au/TiO<sub>2</sub> catalysts, but leads to decreased activity. Improved catalytic activity was observed when a high solution pH was adjusted during the precipitation. Surprisingly, wet impregnation followed by ammonia steam treatment and a washing step with water also leads to Au/TiO<sub>2</sub> with 2- to 4-nm individual gold particles highly dispersed on the TiO<sub>2</sub> surface. In addition, this catalyst is active for room temperature CO oxidation. The temperature for 50% conversion of CO is below 25 °C, which is comparable to that of the gold catalyst prepared by the DP method. Therefore, contrary to reports in the literature, the impregnation method can be used in the preparation of high-activity gold catalysts.

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*Keywords:* Gold catalysts; CO oxidation; Reproducibility; Deposition–precipitation; Impregnation

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