Synthesis, characterization and catalytic application of Au/ZnO nanocomposities, prepared by coprecipitation

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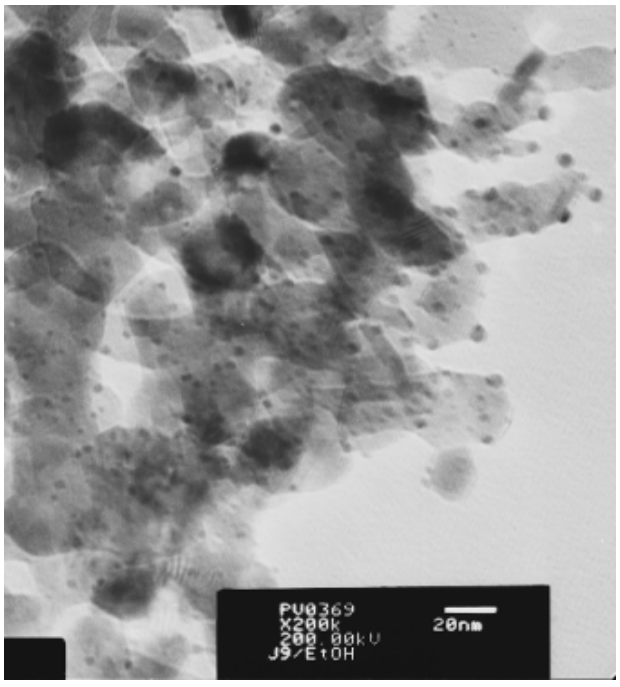
As a bulk material the gold (Au) hasn't got significant catalytic activity. In the form of the nanoparticles (NPs) on the surface of different oxide supports the gold reveals surprising high activity even at room temperature. According Haruta the best catalysts are those containing ~8% Au-NPs with diameter 5-8 nm.

In the present study the Au/ZnO nanocomposities with different gold content were synthesized via coprecipitation method. For comparison the pure ZnO was obtained at the same experimental conditions. The samples were characterized by XRD, SEM, TEM and XPS. The catalytic activity of Au/ZnO nanocomposities was tested to the CO oxidation reaction.



The real gold content in the nanocomposites prepared, determined by AAA is 0.8, 2.5 and 9 wt %. The specific surface area values of the samples are similar and vary between 40 and 46 m^2/g. The TEM observation shows a homogeneous incorporation of gold nanoparticles in the ZnO matrix and narrow nanoparticle size distribution. The average diameter of Au-NPs in the samples, estimated from TEM-micrographs is 4 ± 0.3 nm.

The catalytic performance of Au/ZnO nanocomposites to the CO oxidation shows that the catalytic activity increases 8 to 11 fold after the incorporation of Au-NPs in the ZnO matrix and the temperature of 50 % CO conversion degree decreases with about 50-60ºC. However, there is not a strong correlation between the dopant content and catalytic activity of Au/ZnO nanocomposites..

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