Abstract Number: abs#115

Small angle X-ray scattering of gold nanoparticles supported on catalytic materials

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Nano-gold particles on support material, made up of oxides of Si/Al/Dy/Eu/Nd/SM/Pr/P/C element(s), either single or in combination were studied by means of small angle X-ray scattering. The major benefit of such analysis is the removal of potential ambiguity in the interpretation of TEM and other data by investigating the samples *in situ*, and the benefit of the larger sampling volume of the SAXS technique which therefore generates more accurate statistics when interpreted correctly.

Small-angle X-ray scattering (both lab based and synchrotron) was used to characterise the pore dimensions and distributions of different supports of both empty materials and those containing gold nanoparticles. The structure of gold nanoparticles and their supports have been primarily investigated by electron microscopy but this technique views only the surface structure for a limited area, due to the necessity of sample grinding for electron beam transmission. Measurements were conducted for several gold/platinum nanoparticles and support materials featuring different pore and particle sizes. The changes in the SAXS profile was correlated with composition and preparation conditions.

Nano-structured materials are of great interest in catalytic as well as in speciality electronic applications. Since the development of reliable nanoparticle syntheses, research on the synthesis and stabilisation of metal gold particles has undergone rapid expansion. It is well known that nanoparticles find a variety of applications in catalytic materials, as well as sensors, digital data storage and nano-electromechanical systems.

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