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Over the past few decades, there has been an increasing interest in the use of supported nanoparticles in applications ranging from drug delivery to catalysis. The functionality of such nanoparticles is to a large extent controlled by their shape, exposed surface facets and interaction with the support and their surroundings. However, information about the crystal structure of their bulk and surface is often obtained from measurements averaged over large numbers of particles.

Here, we present environmental transmission electron microscopy (ETEM) studies of the growth of MgO nanorods from Au catalyst nanoparticles in a controlled gas atmosphere, in order to elucidate the mobility of Au surface atoms and the configuration of the Au/MgO interface. The particles are synthesized by depositing a thin layer of Au onto MgO smoke particles. The Au agglomerates into particles that are a few nanometers in diameter, providing a model system for the investigation of nanoparticle surface and interface properties.

Earlier studies report that MgO nanorod growth is driven by the electron beam. The growth is, however, strongly dependent on the gaseous environment in the microscope. We have studied the electron beam induced growth of MgO nanorods over a pressure range from UHV (10^{-9}mbar) to 10^{-4}mbar. Ultra High Vacuum (UHV) studies have been included in order to have a higher degree of control of the initial state and probe the low-pressure regime. The studies have focused on shape changes and growth rates with respect to changes in pressure, gas atmosphere and beam current density.