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Shape, composition and magnetisation of iron oxide nanoislands on strontium titanate

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Their exceptional chemical and magnetic properties together with their biocompatibility and wide availability make Fe_xO_y nanostructures and nanoparticles a common basis for catalysts, magneto-electric elements, nanoscale building blocks in material science and tracers for magnetic particle imaging [1,2,3,4]. For Fe_xO_y nanoparticles in medical applications, a precise tuning of the magnetic properties by controlling composition and defect structure is crucial. The usually less ordered arrangement of wet-chemically synthesised nanoparticles, however, impedes disentangling the influences of preparation and size effects on the magnetic properties using scattering methods [5,6]. This could be overcome using ordered epitaxial Fe_xO_y nanoislands deposited on an inert substrate as a model system.

The preparation and characterisation of Fe_xO_y nanoislands by reflection high en-ergy electron diffraction, grazing incidence small angle X-ray scattering (GISAXS) and grazing incidence X-ray diffraction is presented, suggesting the formation of crystalline nanoislands with a well-defined shape. These samples are the basis for ongoing *in situ* studies probing their magnetic structure and its relations with composition, shape, and defect structure by scattering methods such as polarised neutron reflectivity (PNR) and nuclear forward scattering of synchrotron radiation in grazing incidence geometry.

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Magnetic thin films and interfaces

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