# Structure and magnetism of an ultra small iron nanoparticle superlattice on graphene on iridium

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The physical properties of ultra small clusters, such as magnetism, can differ fundamentally from the bulk material and are dominated by their confinement and atomic structure [1, 2]. The arrangement of such nanoparticles in a superlattice not only allows to reach high density and small size distribution, but it also enables new characterization approaches [2].

Iridium seeding on graphene on Ir(111) allows to grow large area ultra small ~1nm iron nanoparticle superlattices [1]. We studied the system with various measurement techniques in-situ on different setups in order to gain and correlate structural, electronic and magnetic information. Structural characterisation from scanning probe techniques (Fig.1 b) can therefore be linked to surface x-ray diffraction (Fig.1 a) [2]. We have observed a size dependent structural phase transition which we will link to magnetic information from x-ray magnetic circular dichroism (Fig.1 c). An outlook on tailored substrates [3] and the possibility of coverlayers will be given in the end.

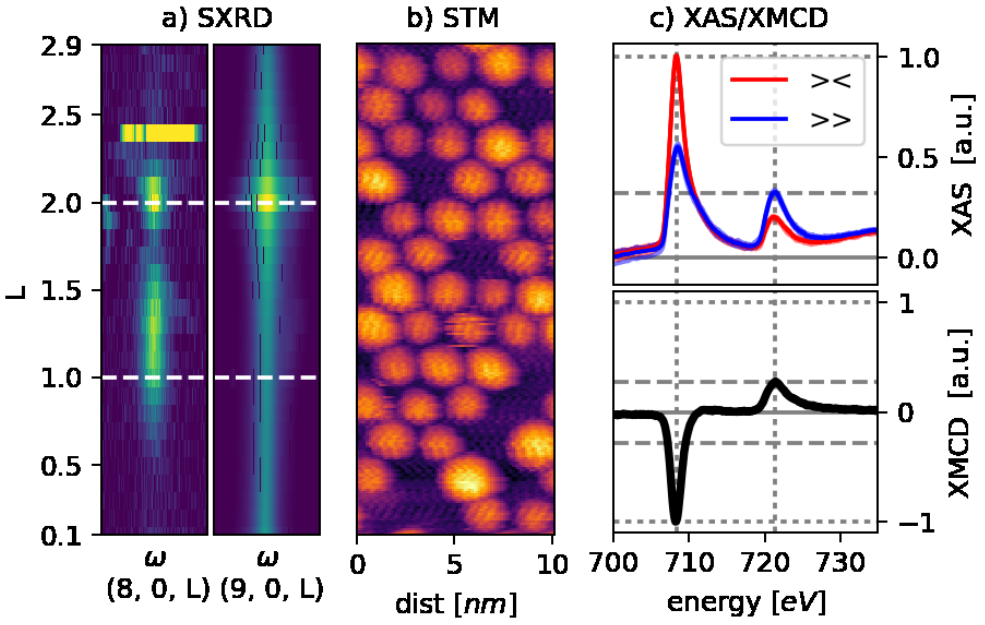


Fig. 1: a) X-ray diffraction scans along a surface and a crystal truncation rod, b) scanning tunnelling microscopy and c) x-ray circular magnetic dichroism on a iridium seeded iron nanoparticle superlattice on graphene on iridium (111).

References:
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