

## **Grazing Incidence Small Angle X-Ray Scattering from Nanoparticles : beyond Classical Analysis Approximations**

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GISAXS (Grazing incidence small angle X-ray scattering) has emerged in the past years as a powerful technique for probing the morphology of nanostructures elaborated on surfaces by recording the diffuse scattering around the specular reflected beam. A recent experimental breakthrough [1] allowed using this synchrotron technique to record background free scattering patterns during the undisturbed growth of islands in ultra-high vacuum environment.

Contrary to real space techniques, extracting morphological parameters as the shape, sizes and size distributions for a classical Volmer-Weber growth implies a complete data analysis that is hampered by the multiple reflection effects induced by the grazing geometry and by the correlations between the size of the scatterers and their separation. It will be shown that suitable models can improve the analysis by (i) including the gradient of index of refraction seen by the incoming and scattered beams contrary to classical Distorted Wave Born Approximation for substrate only [2] and (ii) by calculating the parallel diffuse scattering within the framework of the paracrystal model, thus going beyond the classical Local Monodisperse Approximation [2,3].

[1] Renaud G., Lazzari R., Revenant C., et al., *Science*, 2003, **300**, 1416. [2] a) Revenant C., Leroy L., Lazzari R., Renaud G., *Phys. Rev. B*, 2004, **69**, 035411-1; b) Lazzari R., *J. Appl. Cryst.*, 2002, **35**, 406. [3] Leroy L., Lazzari R., Renaud G., *Acta. Cryst.*, 2004, **60**, 565.

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