

SOME IMAGE ARTEFACTS IN NON-CONTACT MODE FORCE MICROSCOPY

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Non-contact mode Atomic Force Microscopy (AFM), performed in air, of two-dimensional hexagonal close-packed (2DHCP) layers of 200nm diameter polystyrene spheres yields images containing artefacts (“ghost spheres”) at layer edges and vacancy sites (Fig. 1) [1]. The origin of these artefacts is clearly not the simple convolution of the tip and sample geometries, but must be the interaction between them. A computer program was written to simulate the experimental contours, assuming that the only force between the tip and the sample is the van der Waals (dispersion) force, and that the contours traced by the AFM tip are those of constant force derivative. The energy was calculated by integrating R^{-6} over the volumes of the tip and the sample, with a (constant) arbitrary scaling factor. The experimental contours were reproduced by the simulations (Fig. 2), except for the “ghost” artefacts. The assumption that there is only a dispersion force is thus incorrect. The experiments were performed in air, so that all surfaces were coated by a layer of adsorbed moisture. It is proposed [2] that meniscus forces may be the origin of the artefacts.

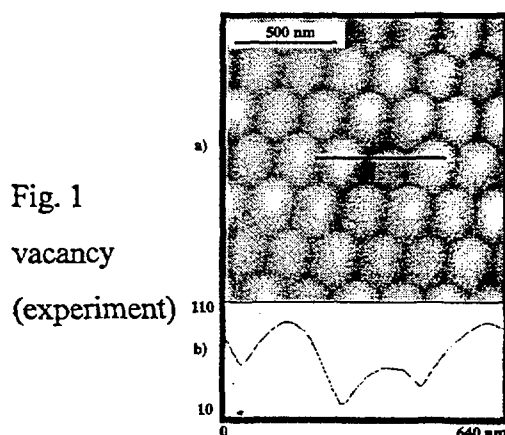


Fig. 1
vacancy
(experiment)

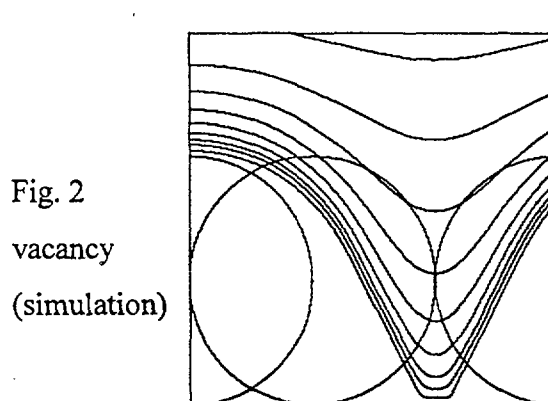


Fig. 2
vacancy
(simulation)

[1] M. van Cleef, S.A. Holt, G.S. Watson, S. Myhra, *J. Microsc.*, (in press)

[2] B.P. Dinte, G.S. Watson, J.F. Dobson, S. Myhra, *Ultramicroscopy*, (submitted)