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X-RAY Surface Radiolysis : Formation Of Metal-Organic Interface

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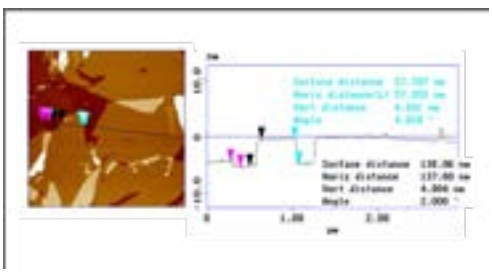
We are developing an original method to obtain nano-objects with adjustable functionalization. We use the self-assembling properties of amphiphilic organic molecules in solution to obtain a nanometric structure. They are functionalized either by choosing an adapted architecture of the molecule, either by using the nano-structure as a template which is coated, i.e. by radiolysis, by a nanometric layer of a chosen element. This versatile procedure appears then to have a strong potentiality for producing various systems. The two procedures can be eventually coupled to enlarge the properties of the obtained nano-object. We present results obtained in a 2D geometry. Irradiating with an x-ray beam at grazing incidence a Langmuir monolayer of behenic acid deposited onto a silver solution, we obtain in a first step a thin silver layer anchored below the organic film. We followed the formation and structure of this metal layer by diffuse scattering, GIXD and surface x-ray fluorescence. The metal/organic films have been transferred onto solid substrate for complementary experiment. XPS measurements confirm unambiguously the presence of silver metallic atoms as AFM evidence a thickness of 4.5 nm for the metallic layer (figure), in agreement with the penetration of the x-ray evanescent wave. In a second step, the growth of silver NPs is observed.Results obtained on copolymer monolayers leading to the formation of NPs and in a 3D geometry, micelles in solution leading to the formation of silver nano-shells will be also presented



Atomic force microscopy image of the surface layer deposited on silicon wafer after radiolysis process at the air-water interface. One clearly observes sharp domains of a few microns size and of 4.6 nm thickness. These domains correspond to the silver layer formed by the surface

Biography

Michel Goldmann associated with Institut des NanoSciences de Paris, France. He has published several papers in reputed journals.

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