

Self-assembly of iron nano-islands on the strain patterned Fe₃O₄(111) surface

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We report a successful growth of a regular array of Fe nanoclusters on nanopatterned magnetite surface. Under oxidation preparation the (111) surface of magnetite exhibits a regular superstructure with three-fold symmetry and 42 Å periodicity [1]. This superstructure represents an oxygen terminated (111) surface reconstructed forming the periodically strained surface. This strain patterned surface has been used as a template for self-assembly growth of metals. The Fe film of the 0.5 Å thickness was deposited on the substrate at room temperature. Fe nanoclusters are formed on top of the surface superstructure in the areas of tensile stress creating a regular array with the period of the superstructure. We also demonstrate that at least initial stage of Fe growth occur in two-dimensional mode. In the areas of the surface where the strain superstructure is not formed, random nucleation of Fe was observed.

[1] I.V. Shvets, N. Berdunov, G. Mariotto, and S. Murphy, *Europhys. Lett.* 63, 867 (2003).

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