EVOLUTION OF Fe LAYER COMPOSITION IN Fe/Si MULTILAYERS OBSERVED BY IN-SITU CONDUCTANCE MEASUREMENTS

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9.7 cm

The Fe/Si multilayers exhibit a strong antiferromagnetic (AF) coupling [1,2]. The crucial role in the appearance of AF interlayer coupling play nonmagnetic Fe-Si mixtures at interfaces. In present work the analysis of the in-situ thickness dependent conductance G(d) is given. During Fe deposition two G(d) ranges with different slopes can be distinguished with an abrupt change between them. Such a behaviour suggests a modification of iron growth mode or structural transition. Correlations between the Fe thickness corresponding to the growth mode transition, the height of the abrupt change, surface roughness and the number of deposited bilayers have been noticed. During Si deposition onto Fe layer, the conductance initially decreases and then saturates. It may be explained as a result of Si diffusion into Fe and formation of low-conductive Fe-Si mixture. Subsequent Si deposition on the Fe-Si mixture leads to growth of nonconductive silicon, thus G(d) plateau appears. Such a plateau was observed only in Fe/Si Mls which show no AF coupling, i.e., for $d_{Si} > 1.3$ nm.

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