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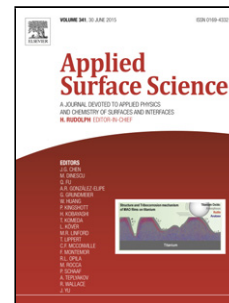
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Author: T. Nordmann O. Kuschel J. Wollschläger

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Epitaxial Growth of Ultrathin MgO Layers on Fe₃O₄(001) FilmsT. Nordmann,^{1,2} O. Kuschel,^{1,2} and J. Wollschläger^{1,2, a)}¹⁾*Fachbereich Physik, Universität Osnabrück, Barbarastr. 7, 49069 Osnabrück, Germany*²⁾*Center of Physics and Chemistry of New Materials, Universität Osnabrück, Barbarastr. 7, 49069 Osnabrück, Germany*

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The initial growth stages of MgO on Fe₃O₄ films are studied by means of x-ray photoelectron spectroscopy and low energy electron diffraction to clarify stoichiometric and structural properties of these layered structures. This bilayer structure is important to fabricate high quality magnetic tunnel junctions based on Fe₃O₄ electrodes and MgO tunneling barriers. For this purpose, the deposition temperature of MgO has been varied between 100°C and 250°C. Initially, MgO grows layer-by-layer on Fe₃O₄/MgO(001) forming a wetting layer. Depending on the growth temperature, after growth of a 2-3 nm thick laminar wetting layer, the MgO films finally start to roughen during growth. Thus the growth of MgO on Fe₃O₄/MgO(001) is described by a Stranski-Krastanov growth mode. Diffraction experiments show that the magnetite ($\sqrt{2} \times \sqrt{2}$)R45° superstructure is removed already during the initial stages of MgO deposition. Furthermore, these experiments show that the MgO film are rougher for growth at low deposition temperatures.

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Keywords: ultra thin films, x-ray photo electron spectroscopy, XPS, low energy electron diffraction, LEED, MgO, magnetite, Fe₃O₄, Stranski Krastanov growth mode, tunneling barrier

^{a)}Electronic mail: jwollsch@uos.de.

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