

Moiré-free ultrathin iron oxide film: FeO(111) on Ag(111)

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Ultrathin iron oxide films epitaxially grown on the (111)- and (0001)-oriented metal single crystal supports exhibit unique electronic, catalytic and magnetic properties not observed for the corresponding bulk oxides. These properties originate mainly from the presence of Moiré superstructures which, in turn, disqualify ultrathin films as model systems imitating bulk materials. We present a route for the preparation of a close-packed Moiré-free ultrathin iron oxide film, namely FeO(111) on Ag(111) [1]. Experimental scanning tunneling microscopy (STM), low energy electron diffraction (LEED) and x-ray photoelectron spectroscopy (XPS) results confirm perfect structural order in the film. Density functional theory (DFT)-based calculations suggest full relaxation of the oxide layer that adopts the atomic lattice of the crystalline support and exhibits properties similar to those of a free-standing FeO. The results open new pathways for model-type studies of electronic, catalytic and magnetic properties of fully-relaxed iron oxide films and related systems.

Acknowledgments:

This work was financially supported by the National Science Centre of Poland (SONATA programme, 2013-2017, grant No. 2012/05/D/ST3/02855, MAGNETON project) and the Foundation for Polish Science (First TEAM programme, 2017-2020, grant No. First TEAM/2016-2/14 ("Multifunctional ultrathin Fe(x)O(y), Fe(x)S(y) and Fe(x)N(y) films with unique electronic, catalytic and magnetic properties" project co-financed by the European Union under the European Regional Development Fund)). T.P and A.K. acknowledge computer time granted by the ICM of the Warsaw University (Project G44-23).

References:

[1] Mikołaj Lewandowski, Tomasz Pabisiak, Natalia Michalak, Zygmunt Miłosz, Višnja Babačić, Ying Wang, Michał Hermanowicz, Krisztián Palotás, Stefan Jurga, Adam Kiejna, Roland Wiesendanger, arXiv:1608.01376v2 [cond-mat.mes-hall] (2018).