Abstract Submitted
for the MAR13 Meeting of
The American Physical Society

Mesoscopic relaxations in homoepitaxial systems and their effect on oxygen adsorption OLEG O. BROVKO, WUWEI FENG, HOLGER L. MEYERHEIM, VALERI S. STEPANYUK, JÜRGEN KIRSCHNER, Max Planck Institute of Microstructure Physics, Halle, Germany — The importance of mesoscopic relaxations in heteroepitaxial systems has been recognized quite a while ago. Both theoretical predictions and subsequent experimental observations have clearly shown the importance of mesoscopic relaxations for electronic, magnetic and geometric properties of heteroepitaxial nanostructures. The implications of mesoscopic relaxations in *homoepitaxial* systems, however, despite theoretical predictions of their importance, are still not fully understood. In the present joint experimental and theoretical paper, by the example of Fe nanoislands grown homoepitaxially on a p(1x1)O/Fe(001) surface we demonstrate that relaxations at the edges of nanoislands do not only determine the electronic and geometric structures of nanoislands' rims but also govern the oxygen adsorption thereon. Contraction of metallic bonds at the edge of Fe nanoislands leads to a corrugation of the edges and the substrate around, which inevitably leads to a change in adsorption height and electronic structure of oxygen atoms residing on the island. Our results outline the importance of mesoscopic relaxations in homoepitaxial nanostructures for the system's electronic and structural properties and the adsorption of light elements and molecules thereon.

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Date submitted: 08 Nov 2012 Electronic form version 1.4