

## Comprehensive studies of Gd-Pt surface alloys grown on Pt(111)

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Intermetallic compounds consisting of rare earth (RE) metals in combination with noble metals (NM) are a class of materials with specific properties that promise a wide range of potential applications. Here, the magnetic properties are defined by indirect interactions between RE atoms *via* the NM lattice. Limiting the dimensionality of such a system to 2D (so-called surface alloys) changes the nature of indirect coupling, for example, a GdAu<sub>2</sub> surface alloy is ferromagnetic while in bulk this alloy is antiferromagnetic [1]. Recently we showed the formation of three different Gd-Pt surface alloys as a function of growth temperature and Gd coverage on Pt(111) substrate [2].

In this presentation, we give a summary of the structural composition and the electronic properties of the surface alloys, disclosed by a combination of scanning tunneling microscopy and spectroscopy (STM/S) and density functional theory (DFT) calculations. Our analysis will focus on the magnetic properties of the investigated systems probed using XMCD method.

[1] M. Corso *et al.*, Physical Review Letters, **1**, 016101 (2010)

[2] M. Przychodnia *et al.*, Physical Review B, **3**, 035416 (2022)