KR 6: Invited Talk - Stefan Förster (DF jointly with O, DS, KR, MM)

Time: Wednesday 10:30–11:15 Location: GER 37

Invited Talk KR 6.1 Wed 10:30 GER 37

Two-dimensional Oxide Quasicrystals: A new class of materials? — •Stefan Förster[1], Klaus Meinel[1], Rene Hammer[1], Martin Trautmann[1], and Wolf Widdra[1,2] — [1]Martin-Luther-Universität Halle-Wittenberg, Halle, Germany — [2]Max-Planck-Institut für Mikrostrukturphysik, Halle, Germany

Two-dimensional materials - like graphene, hexagonal boron nitride, or topological insulators - have recently pioneered a new field of materials science. Their peculiar properties are often related to their specific two-dimensional periodic structure.

Here we report the first observation of a two-dimensional oxide quasicrystal (QC), a new member in the family of 2D materials [1]. The QC is derived from $BaTiO_3$ thin films on a hexagonal Pt(111) substrate. Low-energy electron diffraction (LEED) reveals a twelve-fold rotational symmetry. Scanning tunneling microscopy (STM) at room temperature as well as at low temperatures (80 K) allow to resolve the atomic structure. The aperiodic structure is formed by primitive atomic arrangements in squares, triangles, and rhombi with a universal edge length of 0.69 nm. In addition to this dodecagonal atomic arrangement, building blocks of squares, triangles,and rhombi are also found on $(2+\sqrt{3})$ and $(2+\sqrt{3})^2$ larger scales indicating the characteristic self-similarity of an ordered QC. The observed interface-driven formation of a 2D QC from a perovskite oxide in contact with a hexagonal substrate is expected to be a general phenomenon.

[1] S. Förster, K. Meinel, R. Hammer, M. Trautmann, and W. Widdra, *Nature 502*, 215 (2013).