

Growth and electronic structure of hexagonal BN on a curved Rh(111) crystal

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Understanding the growth of a hexagonal boron nitride (h-BN) monolayer has gained interest in scientific community owing to its many-sided impact in the field of two-dimensional materials. We will show the growth and electronic structure of h-BN on a curved rhodium crystal around the (111) face. While at the flat Rh(111) h-BN forms the “nanomesh” structure due to the lattice mismatch and strong chemical interaction to the substrate [1], h-BN on the stepped surface leads to a faceting of the substrate like on curved Ni [2] but in a slightly different way revealing well-ordered step arrays. As an example, figure 1 shows a Scanning Tunnelling Microscopy image of h-BN/Rh(557) where one observes nanoribbons with hole and wire regions at the (111) facets that are separated by multiple steps. The electronic structure was investigated by X-ray absorption (XAS), core-level and angle-resolved photoemission (ARPES). These spectroscopies reveal that the interaction of h-BN and the substrate gets stronger for stepped Rh substrates (contrary to nickel), see Fig. 2. For vicinal angles with a large miscut $\alpha > 10^\circ$, the (111) facets are too short for establishing the nanomesh and a new stable side facet appears. ARPES measurements finds h-BN bands from this stable facet that reveal a vicinal angle of approx. 23° to Rh(111)..

References

- [1] M. Corso, W. Auwärter, M. Muntwiler, A. Tamai et al., *Science*. **303** (2004) 217.
- [2] L. Fernandez, A.A. Makarova, F. Schiller et al., *2D Materials* **6**, 2025013 (2019); A. A. Makarova, L. Fernandez, K. A. Bokai, F. Schiller et al., *J. Phys. Chem. C* **123**, 593 (2019)

Figures

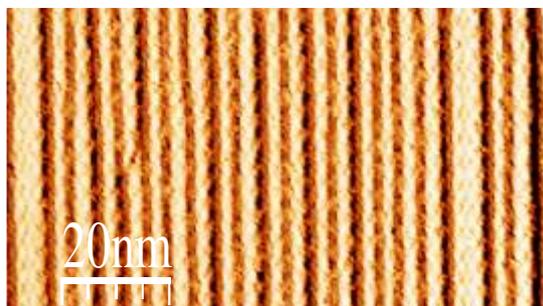


Figure 1: STM image of hBN on Rh(557)

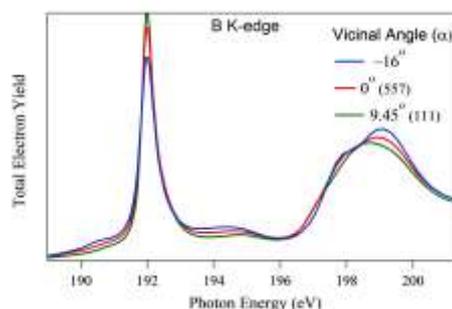


Figure 2: XAS at B K edge for hBN across the curvature, α is the angle w.r.t to the centre of the crystal (557)