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Induced facet formation due to the growth of hexagonal Boron Nitride on curved Ni(111)

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Two-dimensional (2D) hexagonal boron nitride (h-BN) is an isostructural and electrically insulating counterpart to graphene. This material is of technological interest as a substrate for other 2D materials (i.e. graphene) [1], and as isolating layer for electronics and spintronics applications [2]. However one crucial point is the high crystalline quality, because its interface to other materials must be clean and well-controlled. The growth of h-BN has been investigated on low-index single crystalline surfaces, but real faces or nanoparticles contain not only such low-index faces but also steps, defects or additional facets. With our approach we grow h-BN on a curved Ni(111) crystal, detecting by LEED and STM a strong interaction between both materials that leads to a marked facet formation and reorganization of the whole curved Ni(111) crystal [3]. This situation is observed in Fig.1, being the faceting formation strongly developed at the highest miscut angles (curvature angles). Furthermore, angle-resolved photoemission spectroscopy (ARPES) and x-ray adsorption (XAS) experiments suggest a rigid band upshift of the whole valence band of h-BN due to a smaller interaction with the side facets of the curved Ni(111) crystal.

References

[1] C.R. Dean et al., Nat. Naotechnol. 5, 722 (2010).
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[3] L. Fernansez et al., 2DMater 6, 025013 (2019).

Figures

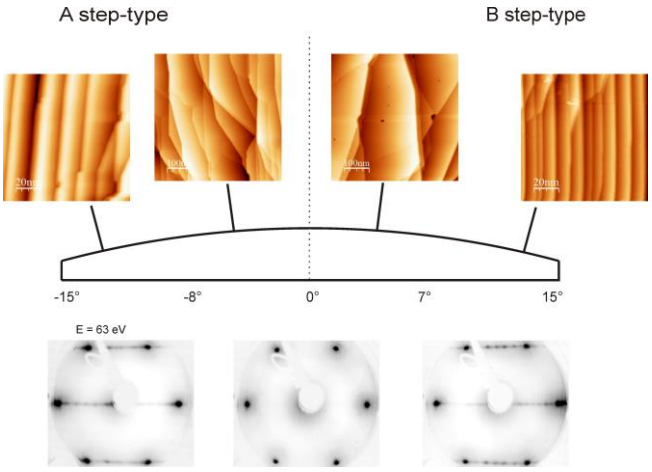

Fig.1: STM and LEED measurements on h-BN grown on curved Ni(111) at different miscut angles.