

# Structure and electronic properties of h-BN on curved crystals

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The structural and electronic properties of hexagonal boron nitride (h-BN) grown on stepped Ni and Rh surfaces are systematically investigated using cylindrical Ni and Rh crystals as a tunable substrate. Our experiments reveal homogeneous h-BN monolayer coating of the entire curved surface, which undergoes an overall faceting on Ni with large facets but h-BN nanoribbon growth on Rh.

The faceted system on Ni is defined by step-free h-BN/Ni(1 1 1) terraces alternating with strongly tilted h-BN/Ni(1 1 5) or h-BN/Ni(1 1 0) nanostripes, depending on whether we have A-type or B-type vicinal surfaces, respectively. Such deep substrate self-organization is explained by both the rigidity of the h-BN lattice and the lack of registry with Ni crystal planes in the vicinity of the (1 1 1) surface. The analysis of the electronic properties by photoemission and absorption spectroscopies reveal a weaker h-BN/Ni interaction in (1 1 0)- and (1 1 5)-oriented facets, as well as an upward shift of the valence band with respect to the band position at the h-BN/Ni(1 1 1) terrace [1].

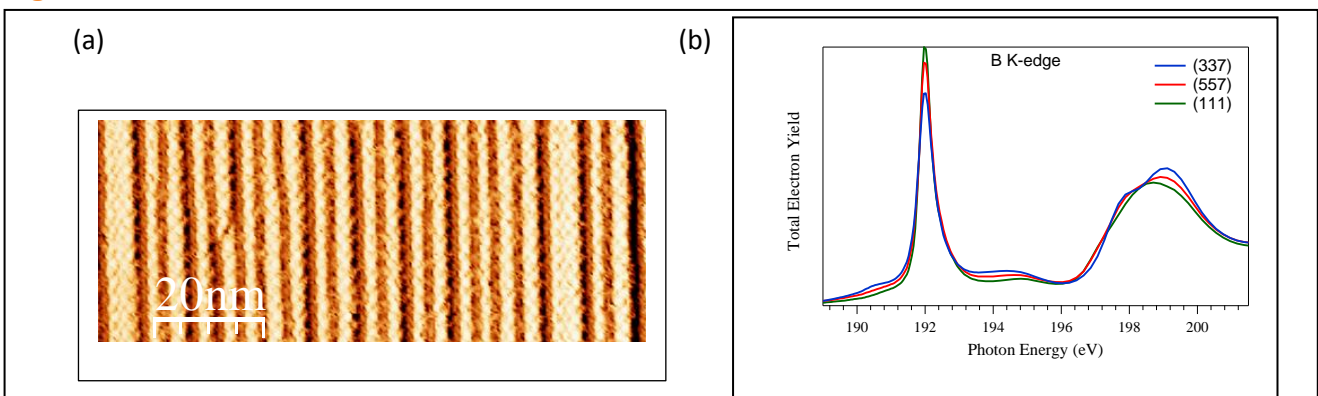
h-BN growth on stepped Rh leads to a transformation of the two-dimensional “nanomesh” structure [2] characterized by hole and wire areas to a formation of h-BN nanoribbons where the width of the nanoribbon is tunable by the substrate vicinal angle. We find faceting of the substrate into (1 1 2) and (1 1 3) surfaces, where interaction with the Rh substrate increases (contrary to Ni). Furthermore h-BN band gap openings due to the limited nanoribbon width are observed.

## References

[1] L Fernandez et al. 2D Mater. 6 (2019) 025013.

[2] M. Corso et al. Science 303 (2004) 217.

## Figures



**Figure 1:** (a) STM image of hBN nanoribbons at Rh(557), (b) X-ray absorption spectra at the boron K-edge of a h-BN film away from the Rh(111) position of the curved crystal revealing the stronger substrate interaction.