

The formation and protective behavior of a hexagonal boron nitride layer on platinum-type surfaces

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and on MS Microsoft (<https://tinyurl.com/2s3ud2j5>)



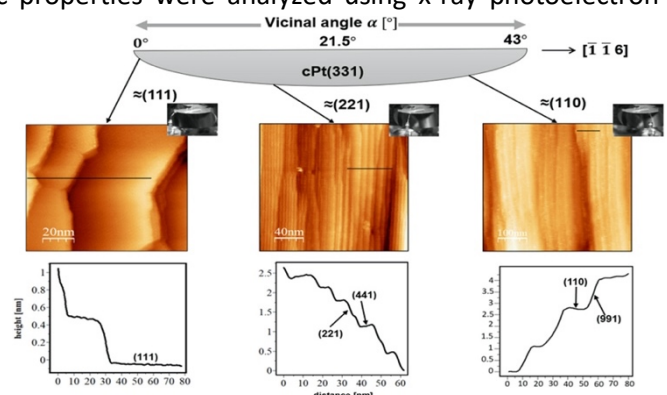
We carried out a comparative study of the electronic and structural properties of hBN on curved transition metal (TM) substrates, namely, c-Pt(111), c-Pd(111), c-Ni(111), c-Rh(111), and flat Ir(111) crystals and their modifications after Eu intercalation. This experimental study was performed in two steps: first, we conducted systematic investigations of the mechanisms involved in forming a Eu-TM alloy surface compounds below hBN. For hBN/Eu/Pt(111) we proofed ferromagnetic behaviour. Additionally, we investigated the possible protection of ferromagnetic Eu-TM alloy through a protective monolayer of hBN [1]. The second part is dedicated to performing a comparative analysis of the electronic and structural characteristics

of hBN when grown on various transition metal (TM) substrates, specifically the B-type vicinal surfaces spanning a range between Pt(110) and Pt(111). Five stable facets after hBN growth were distinguished, namely (110), (111), (221), (441), and (991) [2]. Experimentally, the structural properties were characterized using low-energy electron diffraction (LEED) and scanning tunnelling microscopy (STM), while the electronic properties were analyzed using x-ray photoelectron spectroscopy (XPS), near-edge x-ray absorption fine structure (NEXAFS) and angle-resolved photoemission (ARPES). To understand the formation of the stable surface facets, we will perform theoretical calculations to explore the structural and electronic properties of hBN on Pt(110), Pt(111), Pt(221), Pt(441), and Pt(991) vicinal surfaces.

These investigations should help to build future spintronics devices incorporating 2D material layers like graphene and hexagonal Boron Nitride with a ferromagnetic layer underneath.

[1] Bakhit, Alaa Mohammed Idris, et al. *Nanoscale* **15**, 11517-11528 (2023)

[2] Bakhit, Alaa Mohammed Idris, et al. *Science Talks* **4**, 100071 (2022)



STM images of hBN-covered c-Pt(331) at different positions of the curved substrate ($U_{bias} = 1$ V, $I = 2$ nA). The bottom panels indicate the height profiles for the indicated black lines in the STM images [2].