

Growth of double-layer h-BN nanomesh on transition metal surfaces studied by LEEM/PEEM/XPEEM.

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Self-assembled materials become nowadays a subject of particular interest in modern commercial nanotechnology due to the tempting prospects of using them in mass production. Our research is focused on a specific form of the strain-induced nanopatterning based on the pyrolytic chemical vapour deposition process, which utilizes the recently discovered ability of h-BN to form nanomesh on some lattice-mismatched transition metal surfaces, e.g., Rh(111) [1]. On this surface, a bilayer-mesh of nanometer dimensions consisting of *h*-BN units can be grown by thermal decomposition of borazine (HBNH)₃. Since the preparation of the mesh is relatively straightforward, and since the *h*-BN is exceptionally stable with respect to temperature and the surrounding gas phase, the *h*-BN/metal interface system is currently viewed as a promising template for self-assembled nanocatalysis and nanomagnets. On the other hand, the driving forces for the nanomesh formation remain unclear yet, although it is assumed that the mutual symmetry of the substrate and adsorbate and their lattice mismatch should be of considerable importance [1].

In this contribution we demonstrate the potential of the LEEM/PEEM for revealing the details of the h-BN growth mode on different transition metal (TM) substrates, e.g. Rh(111), Pt(111), Ni(111), Ni(110) and others. We will show that h-BN overlayers can grow very differently depending on the substrate chemistry, symmetry and lattice mismatch, and that only a specific combination of these factors can result in a nanomesh formation.

[1] M. Corso et al., Science 303, 217-220 (2004).