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Boron nitride nanostructures: complete layers and nanomeshes MARTINA CORSO, MARTIN MOERSCHER, SIMON BERNER, THOMAS GREBER, JUERG OSTERWALDER, Physik-Institut, Universitaet Zuerich, Winterthurerstr. 190, CH-8057, Zuerich, Switzerland, ANDRII GORIACHKO, Physikalisch-Chemisches Institut, J. L. Unversitaet, D-35392 Giessen, Germany — A highly ordered self-assembled nanomesh grows on a hot (1000 K) Rh(111) surface during 40 L (1 Langmuir=10^{-6} $torr \times s$) of borazine $(HBNH)_3$ exposure [1]. Hexagonal boron nitride (h–BN) units aggregate to form this double-layer network of 3 nm periodicity and 2 nm hole size. The two layers are offset so that nearly the entire underlying metal surface is covered. This system can be used as a template for supramolecular structures, as demonstrated with C_{60} molecules, or for any purpose where a nanopatterned surface that is stable at high temperatures (1000 K) is needed. One of the driving forces for its formation is the large lattice mismatch of 6.9 % between the h–BN film and the Rh substrate. The growth of similar nanomeshes on different substrates is investigated, with the purpose to control hole size and shape. It is found that not only the lattice mismatch and the symmetry of the underlying metal play an important role but also the bonding between the nitrogen atoms and the substrate. In fact nanomeshes can be grown on Ru(0001) and on Ir(111) thin films but it does not form on Pd(111) nor on Pd(110). [1] M. Corso et al. Science, 303 (2004) 217.

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