

## Single layer boron nitride: From templates to functionalized membranes

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Single layers of hexagonal boron nitride may be grown on transition metal surfaces by means of chemical vapour deposition of borazine ((HBNH)<sub>3</sub>). Using Rh [1] or Ru [2] as substrates leads to the formation of peculiar super-honeycomb structures, where in the case of Rh 13 BN units accommodate on 12 Rh unit cells. This 3.2 nm super-cell, first called 'nanomesh', houses two distinct electronic systems, on 'wires' where the BN is quasi freestanding and in 2nm 'pores' where the BN wets the Rh substrate [3]. This leads to a peculiar template function, where molecules may be selectively trapped in the 2 nm pores at room temperature. The super-honeycomb may act as a membrane beneath which hydrogen may be intercalated [4], also with electrochemical means [5,6]. The structures can be further functionalized with low energy ions, where single atoms may be implanted beneath the h-BN 'rainfly', in so called 'nanotents' [7]. The vacancy defects that are created in the course of the low energy ion irradiation process may be annealed and lead to the cut out of h-BN flakes formerly bound in the pores of the superhoneycomb [8]. Such systems are exfoliated and used as freestanding single layer membranes [9].

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