Supporting Information

From Growth Surface to Device Interface: Preserving Metallic Fe under Monolayer Hexagonal Boron Nitride

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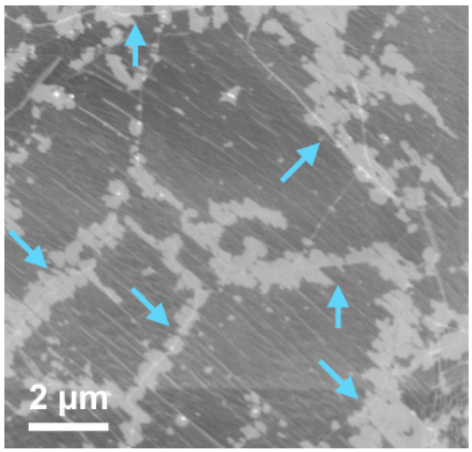

Figure S1. Higher magnification SEM image of h-BN film on Fe substrate after 1 day of air exposure (corresponding to Figure 1e) showing the bright contrast channels where oxidation of the underlying Fe proceeds more rapidly than in other regions.

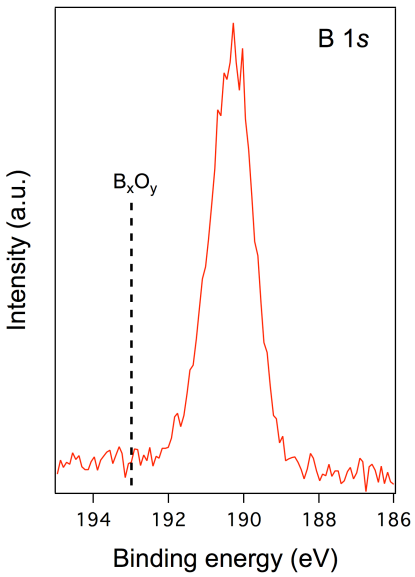

Figure S2. XP spectrum of the B 1*s* core level for h-BN domains on Fe foil exposed to air for ~40 hours, showing the monolayer h-BN peak centred at 190.2 eV. The absence of a signal at ~193 eV (dotted line), which is typically assigned to boron oxide species,[1] demonstrates that the h-BN lattice does not undergo a significant degradation during room temperature air exposure. The spectrum is collected at a photon energy, E_{photon}, of 912 eV using the setup available at the Escamicroscopy beamline of Elettra synchrotron facility (Trieste, Italy).

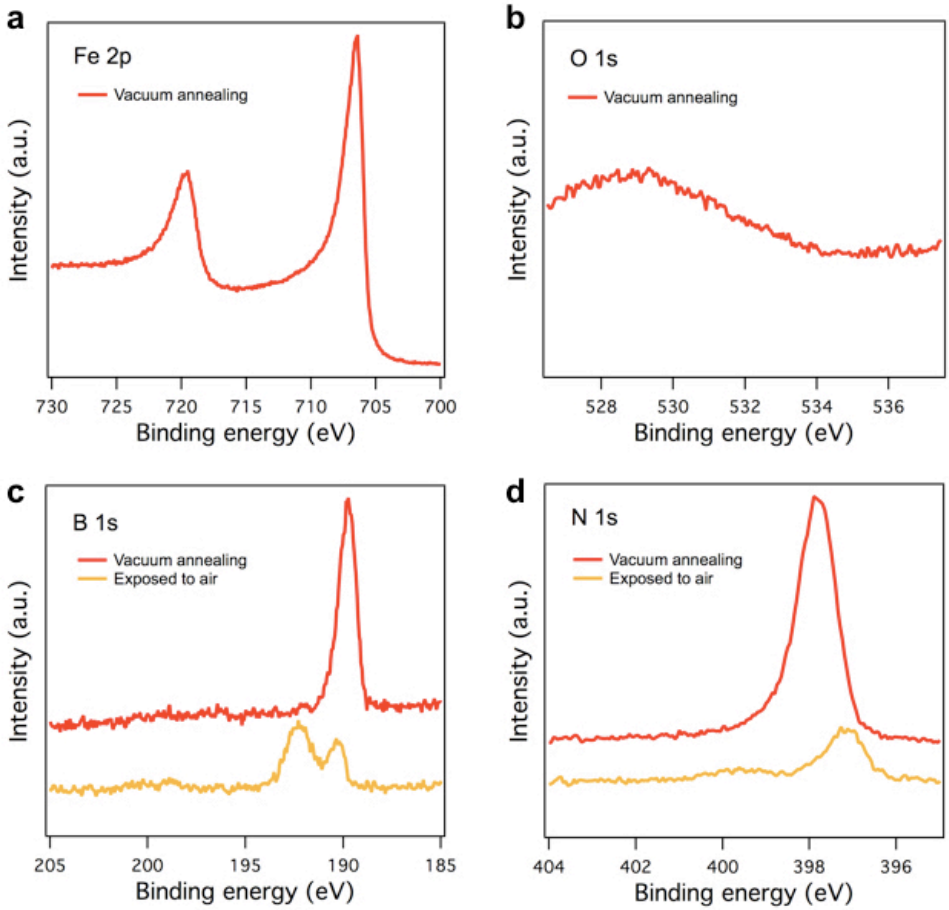

Figure S3. XP spectra of h-BN domains on Fe foil during vacuum annealing at ~600 ºC using the **(a)** Fe 2*p* and the **(b)** O 1*s* core level energies, demonstrating the previously oxidized Fe has been reduced and there is a corresponding decrease in the oxygen content. XP spectra of the **(c)** B 1*s* and **(d)** N 1*s* core level energies acquired on the same sample during vacuum annealing and after subsequent exposure to ambient air. The Fe 2*p*, O 1*s*, B 1*s* and N 1*s* spectra are collected at photon energies, E_{photon}, of 920 eV, 680 eV, 400 eV and 620 eV respectively. All binding energies are referenced to measured Fermi edges.

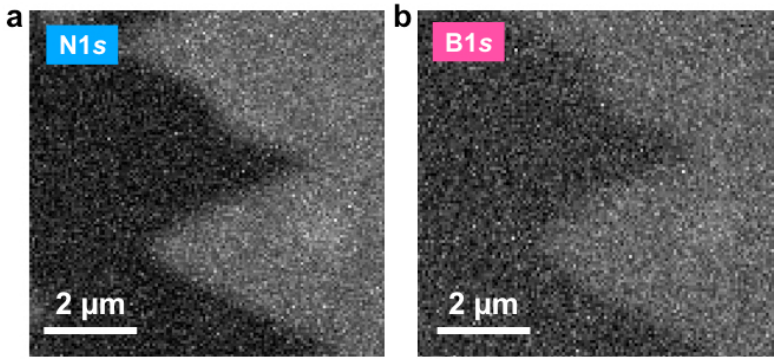

Figure S4. SPEM chemical maps (i.e. topography removed) from the region enclosed within the red dotted square in Figure 4a, using the **(a)** N 1*s* and **(b)** B 1*s* core level energy. The B 1*s* and N 1*s* maps are collected at photon energies, E_{photon}, of 912 eV and 704.5 eV respectively.

References

(1) Müller, F.; Hüfner, S.; Sachdev, H. Epitaxial Growth of Boron Nitride on a Rh(111) Multilayer System: Formation and Fine Tuning of a BN-Nanomesh. *Surf. Sci.* **2009**, *603*, 425–432.