

Supplementary information

2D graphitic-like gallium nitride and other structural selectivity in confinement at graphene/SiC interface

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Figure S1. (left) ADF image of intercalated graphene/SiC acquired in SI mode with boxes on bulk 4H-SiC and amorphous carbon. (right) Related EELS spectra integrated over each area which show a negligible oxygen K-edge signal in bulk SiC and a very weak oxygen K-edge signal in air-oxidized amorphous carbon.

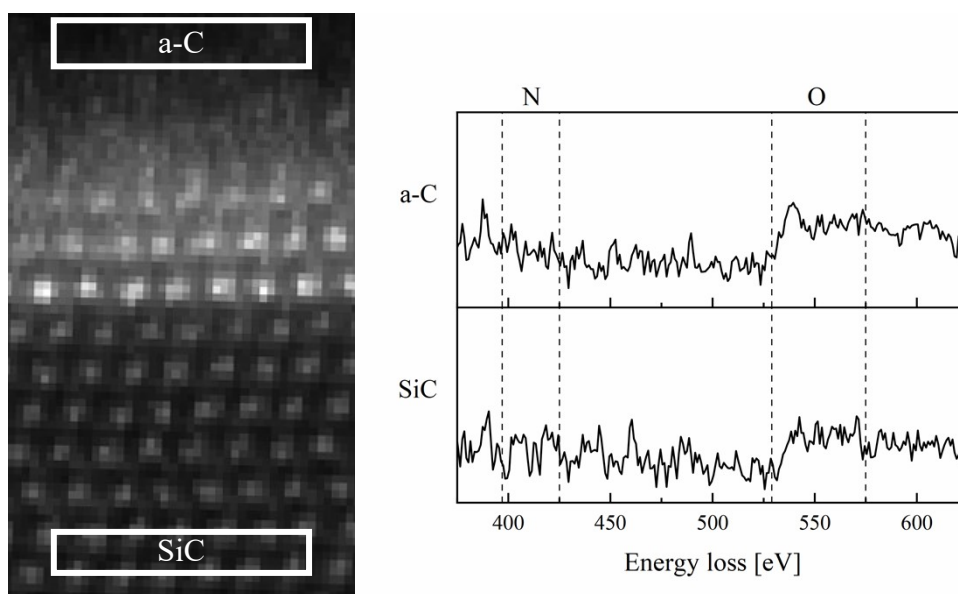
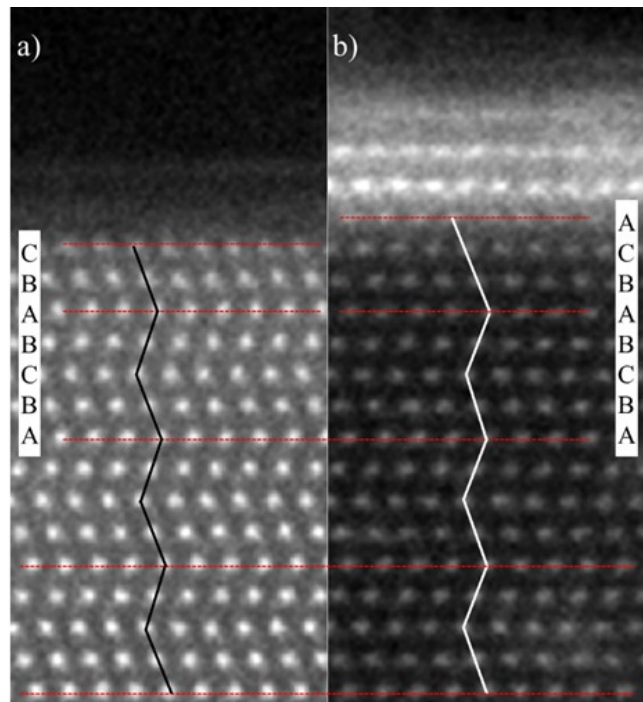


Figure S2. HAADF image of non-intercalated (a) and intercalated (b) graphene/4H-SiC interface. We note a presence of a 3C-SiC stacking fault in the substrate at the interface with the GaN monolayer in the image of (b).



It is noticeable that the intercalated and non-intercalated regions can be associated with different degrees of carbon layer coverage. The intercalated regions are located beneath a single layer of graphene. The regions without intercalation are further covered by a carbon buffer layer and therefore it is indicative that the Si sublimation process has progressed much further in these regions of the substrate. It is reasoned that down to five bilayers in the sub-surface of the SiC substrate can be structurally influenced by the graphene formation mechanism depending on the details of the high-temperature sublimation process and the annealing environment [Ref.1S].

[Ref.1S] M. Gruschwitz, H. Schletter, S. Schulze, I. Alexandrou, Christoph Tegenkamp, *Epitaxial graphene on 6H-SiC(0001): Defects in SiC investigated by STEM*, Phys. Rev. Mater. 3 (2019) 094004.