

Abstract Submitted
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Sub-nanometer milling of layered materials by a focused Helium Ion Beam HONGZHOU ZHANG, DANIEL FOX, YANGBO ZHOU, ROBERT O'CONNELL, School of Physics and CRANN, Trinity College Dublin — The modification of the structure and geometry of materials at the nanoscale can be used to tailor their properties. A controllable process which can achieve this is required for the development of next generation nano-devices. We used the highly focused beam of helium ions in a helium ion microscope (HIM) to fabricate nanostructures within various layered materials such as graphene, MoS₂, TiO₂ and Mn₂O₃. Arbitrary patterns can be defined in order to produce structures such as nanoribbons. The edge configuration of atoms in such structures plays a large role in defining their properties. High resolution transmission electron microscopy (TEM) and scanning-TEM (STEM) were used to analyse the structure of the materials after milling. The direct milling of the materials by the helium ions means this approach is suitable for a wide range of nanomaterials. Complex structures can be realized via sophisticated beam control. This also results in the ability to mill along different directions in a crystal, producing edges with different configurations.

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