



Contribution ID: 284

Type: Poster

【262】 Gate-dependent polarity switching in high-quality 2D material single-crystal nanoribbon networks

Tuesday 31 August 2021 19:11 (1 minute)

We demonstrate an approach to manufacture 2D materials into nanoribbon networks. Small organic molecules deposited on 2D materials can form nanoneedles aligning predominantly in either zig-zag or armchair orientation. This study shows their usage as masks. These hybrid heterostructures are plasma etched resulting in single-crystal nanoribbon networks. Raman spectroscopy, atomic force microscopy and electrical measurements are employed to verify the ribbons' network and transport properties. Ribbon based devices were found to exhibit pronounced gate dependent polarity switching, mimicking behaviour of ferroelectric based devices. Our method opens a new avenue for straightforward production of 2D material nanoribbon network devices with variable polarity on a scale relevant to optoelectronic applications and sensors.

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Session Classification: Poster Session

Track Classification: Surfaces, Interfaces and Thin Films