A universal method for fabrication of high-quality 2D material nanoribbon networks

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We demonstrate an approach to manufacture 2D materials including Graphene, MoS_2, GaSe, hBN, and their heterostructures into nanoribbon networks. Small organic molecules deposited on 2D materials form nanoneedles aligning in high-symmetry directions of the 2D material substrate. We demonstrate their usage as masks. These hybrid heterostructures are plasma etched resulting in single-crystal nanoribbon networks. Various characterization techniques are employed to verify the ribbons' network structural and transport properties. Ribbon-based Gr devices were found to exhibit pronounced gate dependent polarity switching, mimicking ferroelectric behavior. Our method opens a new avenue for straightforward production of 2D material nanoribbon network devices.