

# PLASMA TREATMENT OF BLACK PHOSPHORUS FLAKES

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**B**lack phosphorus (BP) is a new two-dimensional semiconductor consisting of a weak van der Waals interlayer interaction and strong in-plane bonds. BP has high carrier mobility and tunable band gap from 0.3 to 2.0 eV, offering excellent performances for electric and optoelectronic devices. However, thin BP flakes are difficult to be fabricated. Here we report a controllable thinning method by using hydrogen plasma etching to thin down mechanically exfoliated BP flakes. Atomic force microscope, optical microscopy and Raman techniques was used to identify process conditions. Not only the thickness of the BP flakes can be controlled, but also the defects of the exposed BP surface are removed after plasma treatment. It is expected to improve the electrical performance of BP based field-effect transistor. This method provides a new way to fabricate BP-based electronic and optoelectronic devices in the future.

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