Controllable Etching of 2-Dimentional Hexagonal Boron Nitride by Using Oxygen Capacitively Coupled Plasma

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ABSTRACT:

We present a novel etching technique for 2-dimentional (2-D) hexagonal boron nitride (h-BN) by using capacitively coupled plasma (CCP) of oxygen combined with a post-treatment by de-ionized (DI) water. Oxygen CCP etching process for h-BN has been systematically studied. It is found that a passivation layer was generated to obstruct further etching while it can be easily and radically removed by DI water. An essential cleaning effect also has been observed in the etching process, organic residues are successfully removed and the surface roughness has much decreased. Considering h-BN is the most important 2-D dielectric material and its potential application for graphene to silicon-based electronic devices, such an etching method can be widely used to control the 2-D h-BN thickness and improve the surface quality.

KEYWORDS: Boron nitride, plasma etching, cleaning, graphene