Increasing the Rate of Magnesium Intercalation Underneath Epitaxial Graphene on Silicon Carbide.

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Magnesium intercalated 'quasi-freestanding' bilayer graphene on 6H-SiC(0001) (Mg-QFSBLG) has many favorable properties - highly n-type doped (≈10^{14}), relatively stable in ambient conditions (6 hours) and large bandgap (≈0.36 eV). However, the intercalation of Mg underneath graphene is challenging, requiring multiple intercalation steps.

This poster will briefly overview our recently published works on Mg intercalated graphene, and subsequently, how one can overcome the intercalation challenges posed by Mg. To do this, we laser pattern (ablate) the graphene to form micron-sized discontinuities, and show that this results in a significant increase in the rate of Mg intercalation as observed using low energy electron diffraction and X-ray photoelectron spectroscopy. By modeling Mg intercalation with the Verhulst equation, we are able to empirically compare the intercalation rate between patterned and non-patterned samples. Our model implies that the increased intercalation rate is proportional to the increase in edge length from the micron-sized discontinuities. Furthermore, the model and patterning technique we use may be applicable for other difficult to intercalate materials.

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