Exploring the structure and dynamics of alkali metal and metal chlorides intercalated in bilayer graphene

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Exploring the structure and dynamics of alkali metal and metal chlorides intercalated in bilayer graphene has garnered considerable interest for its potential in tailoring the electronic, magnetic, and optical properties of graphene-based materials. Understanding the precise characterization of the intercalation process and resulting atomic arrangements is pivotal for comprehending fundamental interactions and their impact on material properties. In this investigation, scanning transmission electron microscopy (STEM) is employed to scrutinize the atomic structure of metal chlorides (AlCl3, CuCl2, MoCl5, FeCl3)[1,2] and alkali metals (K, Rb, Cs)[3] intercalated in bilayer graphene (BLG). High-resolution visualization and analysis of the atomic structure within the intercalated BLG samples are achieved through STEM imaging. Our findings unveil distinct patterns and arrangements of metal chloride and alkali metal atoms within the graphene lattice, exhibiting variations in interlayer spacing, local bonding configurations, and atomic ordering based on the specific metal chloride and alkali metal employed. Furthermore, we delve into the influence of intercalation on the electronic structure of bilayer graphene using spectroscopic techniques.

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