Simple and scalable route for the 'bottom-up' synthesis of few-layer graphene platelets and thin films

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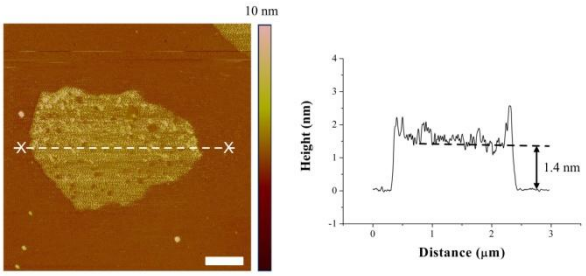
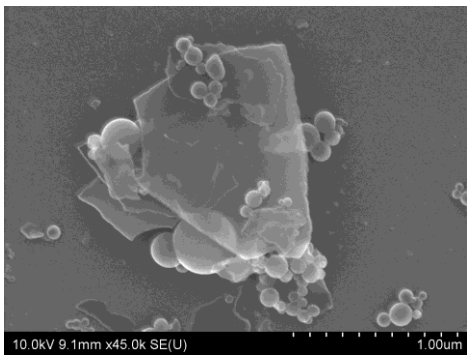
Graphene has generated much interest owing to its exceptional electronic properties and high mechanical strength. This has enabled new types of electronic devices and composite materials to be envisaged. The main problem is the availability of the material and the difficulties associated with its synthesis. Here we present a simple, convenient and scalable chemical vapour deposition method involving metal alkoxides in ethanol to produce few-layer graphene platelets. The methodology used has the added flexibility in that it can be used to grow conducting transparent thin films on inert substrates such as silicon wafer and quartz glass. Importantly, no heavy metal catalysts were required to produce the few-layer graphene platelets or graphene films and all non-carbon by-products are soluble in water.

Figures



TappingMode AFM height image (3 μm × 3 μm, scale bar 500 nm) of a graphene sheet deposited from an ethanol solution onto a freshly cleaved mica surface. The height profile, following the white line on the image, shows the height of the graphene sheet to be ca. 1.4 nm which is equal to approximately 4 layers.



SEM image of graphene platelets stacked on top of one another, scale bar 1 μm.