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Synthesis and Characterization of Large-Area and Highly Crystalline Molybdenum Disulphide Atomic Layer by Chemical Vapor Deposition

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The Isolation of few-layered transition metal dichalcogenides has mainly been performed by mechanical and chemical exfoliation with very low yields. in particular, the two-dimensional layer of molybdenum disulfide (MoS2) has recently attracted much interest due to its direct-gap property and potential application in optoelectronics and energy harvesting. However, the synthetic approach to obtain high-quality and large-area MoS2 atomic thin layers is still rare. In this account, a controlled thermal reduction-sulfurization method is used to synthesize large-MoOx thin films are first deposited on Si/SiO2 substrates, which are then sulfurized (under vacuum) at high temperatures. Samples with different thicknesses have been analyzed by Raman spectroscopy and TEM, and their photoluminescence properties have been evaluated. We demonstrated the presence of single-, bi-, and few-layered MoS2 on as-grown samples. It is well known that the electronic structure of these materials is very sensitive to the number of layer, ranging from indirect band gap semiconductor in the bulk phase to direct band gap semiconductor in monolayers. This synthetic approach is simple, scalable, and applicable to other transition metal dichalcogenides. Meanwhile, the obtained MoS2 films are transferable to arbitrary substrates, providing great opportunities to make layered composites by stacking various atomically thin layers.

Keywords: CVD, Molybdenum Disulphide, Dichalcogenide, reduction-sulfurization

NF-P009

EnhAnced Electric Double Layer Capacitance of New Poly Sodium 4-Styrenesulfonate Intercalated Graphene Oxide Electrodes

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We synthesized a new composite of poly sodium 4-styrenesulfonate intercalated graphene oxide for energy storage devices by controlling oxidation time in the synthesis of graphite oxide. Specific capacitance was improved from 20 F/g of the previous composites to 88 F/g of the new composite at the current density of 0.3 A/g. The capacitance retention was 94% after 3000 cycles, indicating that the new composites of high cyclic stability, prominent performance as electric double layer capacitor, and even low resistance could be an excellent carbon based electrode for further energy storage devices.

Keywords: graphite oxide, supercapacitor