SYNTHESIS OF TWO-DIMENSIONAL MoS$_2$ BY A CVD PROCESS

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Two-dimensional single and few layers of MoS$_2$ have been attract much attention due to their unique property and potential for applications. Synthesis of large area MoS$_2$ on substrate will lead to possible device fabrication. In this study, large area MoS$_2$ of high crystallinity and large size were synthesized by a Chemical Vapor Deposition process. Both triangle-shape-flake and continuous film of monolayer and multilayer MoS$_2$ were obtained. Analysis of layer roughness, size, thickness, uniformity and crystallinity were studied by optical microscope, AFM, SEM, and Raman. The effects of precursor concentration, pressure in chamber, gas flow rate and plasma treatment on MoS$_2$ layer growth were also investigated in order to understand the growth mechanism of triangle-shape MoS$_2$ on SiO$_2$/Si substrate. Understanding of the initial growth was also achieved by studying the crucial role played by the substrate surface condition in MoS$_2$ growth. It was found that the right surface condition before deposition is necessary for successful growth while other conditions were kept the same. The study of growth process will eventually help deposit ultra large size MoS$_2$ layers of wafer scale for applications.

Keywords: Two-dimensional materials, CVD growth, Large size

References:


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