Growth of MoS_2 flakes via close proximity re-evaporation

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We report the two-steps growth process of MoS_2 nanoflakes using Low-Pressure Chemical Vapor Deposition (LPCVD) technique. The first step consists of synthesis of MoS_2 layer on a c-plane sapphire substrate, which afterward has been re-evaporated at higher temperature to mono/few layers MoS_2 flakes. Such close proximity re-evaporation allows to grow pristine MoS_2 nanoflakes. Atomic Force Microscopy (AFM) data confirmed the synthesis of nanoclusters/flakes with lateral dimensions of over 10 □m and flakes' height of approximately 1.3 nm, proving bi-layer MoS_2, whereas Transmission electron microscopy (TEM) analysis reveals triangular MoS_2 nanoclusters, with diffraction pattern proving the presence of hexagonal MoS_2. The Raman data proves the typical modes of high quality MoS_2 nanoflakes. Finally, we present the photocurrent dependence of a MoS_2-based photoresist under illumination with Light-Emitting Diode (LED) of 405 nm wavelength. The measured current- voltage dependence across various luminous flux outlines the sensitivity of MoS_2 to polarized light.

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