

Controllable Synthesis of MoSe₂ Crystal by Chemical Vapor Deposition

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The needs for flexible and transparent properties in electronic materials have been increased to fulfil the properties of future devices. For this reason, many researchers have studied two-dimensional nanomaterials such as graphene and transition metal dichalcogenides (TMDCs). In particular, TMDCs such as MoS₂ and WS₂ have received considerable attention due to their excellent electronic, optical, mechanical properties. These materials have potential for use in nano-electronics, photonics, sensors, and optoelectronics. Many synthetic approaches based on chemical vapor deposition (CVD) have been reported to raise up these 2D materials in large area with high uniformity. However, the preparation of MoSe₂ in large area has still been a great challenge. In this research, we have synthesized a high quality MoSe₂ focusing on changing the factors of CVD process such as H₂ flow rate, process temperature and time. These results demonstrate the impact of various parameters that affect nucleation density during the synthesis process of MoSe₂. This work regarding the synthesis of MoSe₂ crystal will find many applications in various flexible, transparent future electronic devices.