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Chemical Vapor Deposition Growth of InSe Heterostructures

Abstract

The group-III monochalcogenides such as indium selenide (InSe) represent a class of two-dimensional materials with unique properties. The van der Waals hetero-structures of the InSe and hexagonal boron nitride (hBN) are potentials for novel electronic device in the future. However, most of the InSe/h-BN devices have been based on mechanical exfoliation [1,2], which results in random lateral size and uncontrollable thickness of samples. In our previous work [3], the chemical vapor deposition (CVD) synthesis of high-quality, large-area InSe monolayers has been reported. Here, we report that a direct CVD growth technique provides type II heterostructural stacking film "InSe on hBN" (InSe/hBN). In Figure 1a it was shows that the optical microscope (OM) and atomic force microscope (AFM) images of hBN before and after CVD InSe growth. In Figure 1b, cross-section TEM image of a monolayer InSe film upon few-layer hBN showing the atomic arrangement. Meanwhile, the synthesized InSe films can be grown to hBN substrates, prompting research efforts to probe its characteristics and applications of stacked heterostructures.

References

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Figures

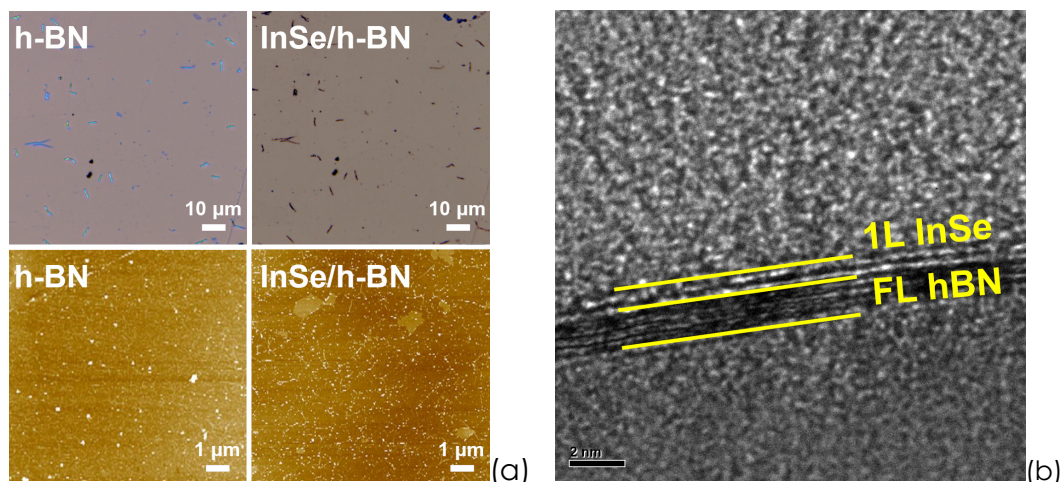


Figure 1: (a) OM and AFM images of hBN before and after CVD InSe growth; (b) Cross-section TEM image of the InSe/hBN heterostructure film.