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Epitaxial growth of 2D layered InSe by using molecular beam epitaxy

Chia-Hsing Wu[1], Yen-Teng Ho[1], Chenming Hu[1], Hsiao Yuan Huang[2] and Chu-Shou Yang[2]
[1]National Chiao Tung University, Republic of China
[2]Tatung University, Republic of China

Two-dimensional (2D) indium selenide (InSe) has attracted considerable attention due to the large tunability in the band gap (from 1.4 to 2.6 eV) and high carrier mobility. In this study, InSe thin films were grown on c-plane sapphire substrate by using molecular beam epitaxy. A phase transformation between γ-In2Se3 and InSe was observed when indium vapor pressure ratios were adjusted under TSe 198 and Tsub 560 . When the in cell temperature (TIn) set at 690 to 730 , γ-In2Se3 was dominated, while TIn>740 , the γ-In2Se3 and InSe will coexist. In order to purify the crystalline into pure InSe phase, we used a post treatment with In flux on grown films surface at TIn of 740 and Tsub 560 □ for 3~50 min and then keep the temperature for 30 min. The intensity of InSe phonon mode at 266 cm-1 was strongly related with the treatment period. Hexagonal InSe with layered structure would be promising for 2D semiconductor application.

Biography

Chia-Hsing Wu has received his PhD in Electro-Optical Engineering from Tatung University (Taiwan) in 2015. He joins the 2D materials group as postdoctoral researcher of Center for Semiconductor Technology Research in National Chiao Tung University in 2018. His current research interests are in the synthesis technology of 2D semiconductors (TMDs) for low power logic device applications.

ab708011@gmail.com

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