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The study of epitaxial InxSey thin films grown on GaAs(100) and c-plane sapphire by using molecular beam epitaxy

Chia-Hsing Wu[1], Yen-Teng Ho[1], Chenming Hu[1], Hsiao Yuan Huang[2] and Chu-Shou Yang[2,3*]
[1]National Chiao Tung University, Republic of China
[2]Tatung University, Republic of China

In this study, hetero-epitaxy of InxSey thin films grown on GaAs(100) and c-plane sapphire substrates by using molecular beam epitaxy were demonstrated. A phase transformation between γ-In_2Se_3 and InSe were observed as varying In/Se vapor pressure ratios. The crystal structure were defined by X-ray diffraction and Raman spectroscopy. The pure γ-In_2Se_3 with In/Se ratio of 0.67 was achieved on GaAs(100) substrate at 400. In contract, pure InSe with hexagonal structure were achieved on c-plane sapphire as In/Se ratio near 1.04. In the photoluminescence spectrum (PL) of γ-In_2Se_3, the free exciton emissions was determined at 2.141 eV. The active energy of γ-In_2Se_3 was around 45 meV which determined by temperature dependent PL. It implies that the γ-In_2Se_3 is potentially applied in the opto-electric devices. Hxagonal InSe with layered structure would be promising for 2D semicondutor application.

Biography

Chia-Hsing Wu has received his PhD in Electro-Optical Engineering from Tatung University (Taiwan) in 2015. He join 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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