

TF-P013

Optical Transitions of a InGaP–AlInGaP Semiconductor Single Quantum Well in Magnetic Fields

김용민¹, 신용호¹, 송진동²

¹단국대학교, ²KIST

Application of magnetic fields is important to characterize the carrier dynamics in semiconductor quantum structures. We performed photoluminescence (PL) measurements from an InGaP–AlInGaP single quantum well under pulsed magnetic fields to 50 T. The zero field interband PL transition energy matches well with the self-consistent Poisson-Schrödinger equation. We attempted to analyze the dimensionality of the quantum well by using the diamagnetic shift of the magnetoexciton. The real quantum well has finite thickness that causes the quasi-two-dimensional behavior of the exciton diamagnetic shift. The PL intensity diminishes with increasing magnetic field because of the exciton motion in the presence of magnetic field.

Keywords: high magnetic fields, semiconductor quantum well, photoluminescence, exciton

TF-P014

Optoelectric properties of gate-tunable n–MoS₂/n–WSe₂ heterojunction with proper electrode metals

이섭균, 박민지, 유경화

연세대학교 물리학과

Two dimensional transition-metal dichalcogenides (TMDs) semiconductors are attractive materials for optoelectric devices because of their direct energy bandgap and transparency. To investigate the feasibility of transparent p-n junctions, we have fabricated a p-n heterojunction consisting of p-type WSe₂ and n-type MoS₂ flakes since WSe₂ and MoS₂ with proper electrode metals exhibit p-type and n-type behaviors, respectively. These heterojunctions exhibits gate-tunable rectifying behaviors and photovoltaic effects (ECE ~ 0.2%) indicating that p-n junctions were formed. In addition, photocurrent and photovoltaic effects were observed under light illumination, which were dependent on the gate voltage. In addition, the photocurrent mapping images indicate that the photovoltaic effects comes from the junction area. Possible origins of gate-tunability are discussed.

Keywords: TMDCs, MoS₂, heterojunction, photovoltaic cell, solar cell