allied academies

International Conference on

Materials Science and Engineering

July 23-25, 2018 | Moscow, Russia

W J Fan

Nanyang Technological University, Singapore

Band structures and optical properties of cubic $CsSnBr_3$ Perovskite Nanoplatelets

Perovskite semiconductors have been received great attention due to their potential application in photonic devices, such as laser, LED, solar cell. The perovskite solar cell conversion efficiency is reported up to about 22%. However, there is few reports on the investigation of the k.p band structure of cubic $CsSnBr_3$ perovskite nanoplatelets. In this work, we extracted the band parameters from the first-principles calculation of the cubic $CsSnBr_3$ perovskite. The Luttinger parameters γ1 =10.22, γ2 =4.32, and γ3=1.73 were obtained. Using the obtained parameters, we developed an 8-band k.p method to calculate the optical absorption spectrum of the cubic $CsSnBr_3$ perovskite nanoplatelet with different layer thickness (4 to 8 MLs). The bulk inversion asymmetry was taken into consideration in our model. The energy splitting was observed at non-zero k point (k=0 is the R point). The exciton effect was included in the absorption spectrum simulation. The TE and TM mode exciton enhanced absorption spectrum of $CsSnBr_3$ NPL at room temperature are simulated and obtained. The results could be useful to understand the perovskite based photonic devices.

Speaker Biography

W J Fan received his degree in electrical engineering from National University of Singapore, in 1997. He is an Associate Professor in Nanyang Technological University. He authored/co-authored over 130 refereed journal papers and over 100 conference presentations including 9 plenary/invited talks. According to SCI (Web of Science), the total external citations > 2100 times, his H-index is 22. He co-authored two book chapters. He was awarded JAP outstanding author in 2013. The granted research funding > S$3.9 M from Moe, Astar, Darpa(USA) and Nsg(Japan) as PI/Co-PI. He graduated > 8 PhD students as Main/Co-supervisor. He is the Founder and Vice President of International Optofluidics Organization since 2016. He served as Chair of Symposium B of the 9th International Conference on Materials for Advanced Technologies, Singapore 2017. He is the main editor of Procedia Engineering - Journal of Elsevier (for ICMAT 2017 Symposium B).

e: ewjfan@ntu.edu.sg

Notes: