

The collaboration research for the Dual Graduate School between VNU and JAIST

[Title of collaboration research]

Synthesis of narrow-bandgap colloidal semiconductor quantum dots and their applications for opto-electronic devices

[The members of collaboration research]

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http://www.jaist.ac.jp/~shinya/english/research_theme.html

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Narrow-bandgap colloidal semiconductor quantum dots (QDs) are attractive nanomaterials because of their size-dependent photophysical properties. In addition, they are expected to be key device materials for environmental monitoring, remote sensing, fiber-optic communications, solution-processed solar cells, medical imaging, etc.

Over the past decade, III-V, e.g., InAs, InP, GaAs, QDs have been synthesized and their complex electronic structures and photophysical properties have been disclosed. Recently, the synthetic routes of IV-VI, e.g., PbS, PbSe, QDs are developed and the electronic structure of IV-VI QDs has been investigated. In consequence, it has been shown that the simplistic parabolic band model is quite applicable for the IV-VI QDs.

We have just started the research regarding the solution-processed bulkheterojunction solar cells consisting of PbSe QDs and organic semiconducting materials.

In this joint research, we hope to study the synthesis of new narrow-bandgap QDs and their applications for above-mentioned opto-electronic devices under close mutual cooperation between VNU and JAIST.