KU CHEM FRONTIER FORUM

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Infrared Colloidal Quantum Dots

Prof. Philippe Guyot-Sionnest
The University of Chicago
E-mail: pgs@uchicago.edu

Abstract

The visibility of the colloidal quantum dots (CQD) community greatly improved after the commercial success of QD-LED TVs pioneered by Samsung and Sony. This application in the visible spectrum took about 20 years after the first bright CdSe/ZnS core/shells. In my opinion, infrared CQDs will become even more interesting because there is no conceivable competition from organics.

Indeed, infrared CQDs imagers are being increasingly studied in industry and academia. I will describe the HgTe mid-infrared CQDs and progress/issues with device performance.

Prior to HgTe, our focus was on the intraband transition of CQDs. These transitions promised wide flexibility of the semiconductor material, and their study led to basic advances in carrier doping, ohmic conductivity in CQD films, and the understanding of the phonon bottleneck.

Around 2014, the observation of wide gap CQDs with stable and strong infrared resonance rekindled interest in the intraband transitions. Detector performances are still much worse than for interband transitions and this is a challenge, but there are some "bright" prospects.

Biography

1991-Present Professor of Chemistry and Physics
at the University of Chicago and the James Franck Institute, USA
1988-1991: Research scientist, Laboratoire pour l'Utilisation du Rayonnement Electromagnetique (LURE). Universite Paris-Sud, Orsay, France
1987 PhD. in Physics University of California at Berkeley, USA

주최: 4단계 BK21 화학교육연구단 / IBS 분자분광학 및 동력학연구단
문의: 화학과 정광섭 교수
(Email: kwangsjeong@korea.ac.kr, TEL: 3290-3127)