



IBS Center for Molecular Spectroscopy and Dynamics

Seminar

■ **SPEAKER**

Prof. Pieter Geiregat (Ghent University)

■ **TITLE**

Towards Printable IR Opto-Electronics-Ultrafast Spectroscopy of Colloidal Infrared Quantum Dots

■ **ABSTRACT**

Printed opto-electronics based on solution processable colloidal semiconductor quantum dots (QDs) can make available a much-needed small footprint, low cost and flexible platform for optical sensing, imaging and spectroscopy in the technologically relevant short and mid-wave infrared (IR) spectrum (1.5 μm – 5 μm). However, while this revolution took place in the visible spectrum, and is happening at the side of detection for IR light, QD IR light source technology is currently expensive, lacking performance and is based on restricted chemical elements. Moreover, final device assemblies have large footprints, limiting their functionality in consumer devices requiring large scale deployment. Hence, there's a clear need to explore a route towards 'printable IR opto-electronics' by developing a new class of solution-processable QDs based on non-restricted elements with efficient IR emission.

In this talk, I will set the scene for this revolution by focusing on the essential photo-physics underlying light emission and amplification in narrow gap, IR active, colloidal QDs. In particular, we studied their (non-)linear optical properties, using ultrafast and broadband IR optical spectroscopy from the NIR to the MIR, in particular focusing on the fundamental questions related to the QD's organic/inorganic interface and how to optimize spontaneous & stimulated IR emission. Finally, I will zoom in on how we can combine these materials with silicon based integrated optical circuits to realize cheap & small-footprint IR light sources, in particular optically pumped lasers.

■ **DATE AND VENUE**

June 3, 2022 (Friday, 16:00 - 17:00)
Virtual Seminar

■ **LANGUAGE**

English

■ **INVITED BY**

Prof. Kwang Seob Jeong