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# Seminar

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■ **SPEAKER**

Prof. Jooyoung Sung (DGIST)

■ **TITLE**

Deciphering Hidden Charge Carrier Dynamics in Energy Materials by Transient Absorption Microscopy

■ **ABSTRACT**

The functional light-driven materials often exhibit a complex morphology consisting of various grains with short and long-range order and defects stemming from imperfect chemical composition, local strain and etc. Local structural and morphological heterogeneity results in distinct carrier dynamics at different local regions of energy materials. Unfortunately, the conventional spectroscopy techniques reveal only an incomplete picture of the carrier dynamics due to the intrinsic spatially averaged nature of time-resolved techniques. In other words, true structure-function relationships in complex energy materials cannot be reliably probed using conventional time-resolved spectroscopic techniques.

By utilizing time and space resolved technique, i.e., transient absorption microscopy (TAM), we were able to directly monitor local carrier dynamics of spatially heterogeneous systems. In this talk, I will briefly describe the basic operating principle of state-of-the-art ultrafast transient absorption microscopy. I will further discuss recent applications of TAM to thin film hybrid metal halide perovskites; 1) A direct monitoring of ballistic transport of non-equilibrium charge carriers in a series of MAPbI<sub>3</sub> perovskite thin film.<sup>1,2</sup> 2) The effect of nanoscale chemical heterogeneity in alloyed perovskite thin films.<sup>3</sup> 3) The unexpected carrier dynamics of 2D/3D mixed perovskite thin film. Finally, I will present recent interesting studies on unprecedented exciton dynamics in quantum dots films; 1) The early-time super-diffusive dynamics of exciton in a series of PbS quantum dot arrays.<sup>4</sup> 2) Nonequilibrium carrier dynamics in quantum dot-in-perovskite. <sup>5</sup>

■ **DATE AND VENUE**

March 29, 2022 (Tuesday, 17:00 - 18:00)  
Virtual Seminar

■ **LANGUAGE**

Korean

■ **INVITED BY**

Dr. Jongmin Lim