FIR CENTER SEMINAR

Size-Controlled Organic Nanocrystals: Impact on Steady-State Optics and Ultrafast Dynamics

Speaker: Dr. Andi Marwanti Panre

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Date & Time:

14:30~15:30 , Sep 12th (Fri), 2025

Room:　Colloquium room, 5F, FIR UF

Organizer: FIR UF (Univ. of Fukui)

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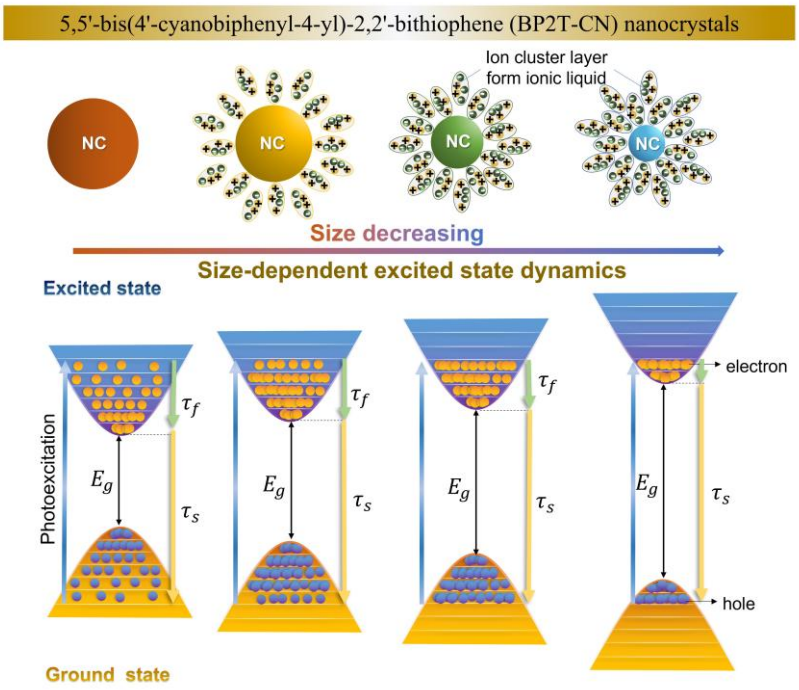
Abstract



Organic semiconductor nanocrystals offer a compact platform for controlling light–matter interactions, yet quantitatively linking nanocrystal size to optical signatures and relaxation pathways remains challenging. This talk presents a surfactant-free, ionic-liquid–assisted reprecipitation method that reproducibly controls the size of 5,5′-bis(4′-cyanobiphenyl-4-yl)-2,2′-bithiophene (BP2T-CN) organic nanocrystals (86–550 nm), yielding stable dispersions with well-defined morphologies. Steady-state absorption and photoluminescence (PL) measurements show systematic blue-shifts in vibronic features with decreasing size, while PL quantum yield (PLQY) increases with optimized size and surface passivation, indicating improved radiative efficiency. Femtosecond transient absorption and time-resolved PL resolve the underlying relaxation pathways, including excited-state absorption, and quantify size-dependent lifetimes and the branching between radiative and non-radiative channels. Collectively, the results establish structure–property relationships and provide clear design rules, together with a practical processing route, for tuning color and emission efficiency in organic nanocrystals, thereby informing the development of candidate materials for future optoelectronic devices.