Time-resolved Spectroscopic Studies of Intraband Transition Quantum Dot, Gold Nanorod, Wettability of Graphene, and Chromophores in Solutions

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Abstract Various time-resolved spectroscopic techniques with high time and frequency resolvability have been developed to study correlated electron and vibrational dynamics of functional materials and biological systems. In this seminar, I will talk about our recent time-domain spectroscopic studies of (i) mono- and bi-exciton relaxations in intraband transition colloidal quantum dots, (ii) surface plasmonic resonance and ultrafast electron-electron heating processes in gold nanorods, and (iii) hydrophobicity and wettability of graphene. The last subject is about a new development of the 2D electronic spectroscopy technique. Using two phase-locked lasers, we have shown that 2D electronic spectroscopy with wide dynamic range (~6 decades) measurement and femtosecond time-resolution is experimentally feasible. If time allows, I will briefly discuss time-resolved impulsive stimulated Raman spectroscopy with three repetition frequency-stabilized lasers.