

# Photoexcitations in Nanoscale Systems: Charge Separation at Interfaces

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Nanocrystalline systems like semiconductor quantum dots, conjugated polymers, and molecular aggregates are well studied owing to the way their optical properties depend on size and shape. In the first part of this talk I will discuss insights into nanoscale charge transfer we have learned by studying semiconductor heterostructures [1]. I will focus on questions concerning the rate, mechanism, and control of charge separation. In the latter part of the talk I will discuss the primary species formed at type-II heterojunction interfaces in inorganic as well as organic systems. What should we call these radical ion pairs/exciplexes/polaron pairs/charge transfer excitons/bound radical pairs/etc.? Why are they so stable and how can we dissociation them more effectively to form mobile charges?

[1] S. S. Lo, T. Mirkovic, C.-H. Chuang, C. Burda, and G. D. Scholes, "Emergent Properties Resulting from Type-II Band Alignment in Semiconductor Nanoheterostructures," *Adv. Mater.*, DOI: 10.1002/adma.201002290 (2010).