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Single Molecule Approaches for Two Dimensional Nanostructures
THOMAS BAKER, SHAJUN GUO, WEON-KYU KOH, NIKOLAY MAKAROV, ANDREW FIDDLER, ISTVAN ROBEL, VICTOR KLIMOV, None — A variety of two dimensional semiconductor nanostructures have been synthesized recently by a number of different groups. Of these, nanoplatelets made of a single to few layers of material have shown interesting promise due to confinement in only a single direction. The photophysics of these types of structures show large exciton binding energies and narrow emission widths in ensemble measurements. Only a few single molecule experiments have been reported in the literature and we hope to expand the insights that single molecule techniques can provide in the understanding of these new materials. Our group has recently extended our synthetic expertise gained from quantum dots into these 2D nanoplatelets including CdSe, MoS_2 and graphene. Time correlated single photon counting experiments at the single molecule level provide information on the homogenous linewidths, quantum yield variations, and fluorescence lifetimes. Furthermore, two photon correlations at zero time delay allow us to confirm the single molecule nature of the emission and potentially determine biexciton quantum yields and lifetimes.

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