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**Electrically controlled fluorescence quenching of quantum dots on monolayer Molybdenum Disulfide – Part II** ANDREY KLOTS, DHIRAJ PRASAI, Department of Physics and Astronomy, Vanderbilt University, A.K.M. NEWAZ, Department of Physics and Astronomy, San Francisco State University, SCOTT NIEZGODA, NOAH ORFIELD, SANDRA ROSENTHAL, Department of Chemistry, Vanderbilt University, KANE JENNINGS, Chemical and Biomolecular engineering, Vanderbilt University, KIRILL BOLOTIN, Department of Physics and Astronomy, Vanderbilt University — In the second part of this talk, we investigate the mechanisms that enable energy exchange between semiconductor quantum dots (QDs) and two-dimensional (2D) materials. First, we study possible contributions due to multiple mechanisms such as charge transfer, metallic screening, mechanical strain, and Forster resonant energy transfer (FRET). By implementing different 2D materials (graphene, MoS<sub>2</sub>, hexagonal boron nitride), varying their thickness and QD emission wavelengths we demonstrate that QD fluorescence quenching is dominated by FRET. Next, we study the dependence of the FRET rate on electrostatic doping of 2D materials, focusing on the case of monolayer MoS<sub>2</sub>. We develop a simple model, which shows that moderate (<10%) changes in MoS<sub>2</sub> absorption induced by gating lead to much larger (~ 50%) modulation of QD photoluminescence intensity. Finally, we demonstrate that FRET can be used as an efficient spectroscopic tool that probes states in 2D materials that are not accessible via conventional absorption spectroscopy.

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