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**Excitonics of Hybrid Nanostructures Arranged with Mixed Dimensionality** PEDRO LUDWIG HERNANDEZ MARTINEZ, Bilkent University, Nanyang Technological University, ALEXANDER O. GOVOROV, Ohio University, HILMI VOLKAN DEMIR, Bilkent University, Nanyang Technological University — We present a complete study of the Förster-type nonradiative energy transfer in hybrid nanostructures composed of nanoparticles, nanowires and quantum wells, and investigate the effects of quantum confinement in different dimensions. We systematically consider all possible combinations in terms of dimensionality for exciton-exciton interactions in these hybrid architectures, and analyze the resulting energy transfer rates for item-to-item excitonic coupling as a function of dimensionality. We derive a full set of analytical expressions and show that the exciton transfer strongly depends on the dimensionality and geometry of the hybrid system. Arrangements of such nanostructures with mixed dimensionality ranging from the low dimensionality to the high offer important high-efficiency applications in photovoltaics [1,2], while in the reciprocal case (from the high dimensionality to the low) in light generation [3] and LEDs [4]. [1] J. Sambur, et al., Science 330, 63 (2010). [2] M. D. Kelzenberg, et al., Nature Materials 9, 239–244 (2010). [3] R. Yan, et al., Nature Photonics 3, 569-576 (2009). [4] H.V. Demir, et al., Nano Today (2011) doi:10.1016/j.nantod.2011.10.006

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