Abstract Submitted for the OSS13 Meeting of The American Physical Society

The Hybrid Phonoriton in Organic-Semiconductor Heterostructures¹ DAVID FACEMYER, Marshall University — In this work electronic structures and optical properties of organicinorganic phonoriton, a new elementary excitation existing in heterostructures combining both organic and semiconductor materials, are studied. In those systems, the Wannier-Frenkel hybrid exciton has unique and interesting properties that can improve the efficiency of optical materials. When an organic-semiconductor combined heterostructure is illuminated by high-intensity electromagnetic radiation with the frequency of the photons at or near the resonance frequency of the Wannier-Frenkel exciton, we obtain a macroscopically occupied system of hybrid polaritons that further interacts with phonons which will in turn generate the hybrid phonoriton. We will theoretically determine electronic structure, energy and dispersion relation of phonoritons. By analyzing the interactions between the hybrid exciton, photons and phonons, it may be possible to discuss the conditions for phonoriton formation.

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Date submitted: 27 Feb 2013

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