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Molecular Polaron Formation of Acoustic Phonons in Quantum Dot Molecules JOSHUA CASARA, ANDREW JACOBS, CYPRIAN CZARNOCKI, ALESSANDRO MONTEROS, THOMAS PEEV, JOSHUA TIN YAU TSE, YOUSTINA GAD, MICHAEL SCHEIBNER, Univ of California - Merced — In a recent experimental study, coherent and non-dissipative behavior of optical phonons was achieved via the generation of molecular polarons in a coupled quantum dot pair. An optical transparency caused by a Fano-type resonant quantum interference between discrete interdot excitons and continuum single dot-like polaron states [1] revealed the molecular polaron. It has been shown that the phonon-induced transparency is highly controllable by electric field, excitation energy and power. Here we review the molecular polaron formation via optical phonons and we investigate an analogous transparency induced by acoustic phonons. Photoluminescence excitation spectroscopy is used to probe the characteristics of the transparency. The study tests the molecular polaron formation as a function of the longitudinal acoustic phonon density of states in the range from 10 meV to 20 meV above the bare single dot-like neutral exciton ground state transition. [1] M. L. Kerfoot et al., Nat. Commun. 5, 3299 (2014).

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