

Abstract Submitted
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Nan antennae: Far-field fluorescence decay rate modulation in pairs of oriented semiconducting polymer nanostructures¹ MICHAEL BARNES, University of Massachusetts, Amherst, MA 01003, PREDRAG KRSTIC, PRADEEP KUMAR, ADOSH MEHTA, JACK WELLS, Oak Ridge National Laboratory, Oak Ridge, TN 37831 — We report fluorescence lifetime measurements on pairs of uniformly z-oriented polymer nanostructures that reveal far-field coherent coupling persisting on a distance scale of several optical wavelengths. Far-field photonic coupling between pairs of oriented luminescent polymer nanostructures is manifested by an oscillatory modulation in the fluorescence decay rate as a function of interparticle distance (both enhancement and inhibition of spontaneous luminescence relative to isolated particles), that results from modification of the vacuum field at the position of the probe dipole by the presence of the second radiating dipole. These results provide the first observation of a dipole-dipole interaction in the “inductance” interparticle distance scale between the near-field (≈ 200 nm) and far-field (> 500 nm), realized in an easily scalable solid-state format at room temperature, important for the realization of efficient nanophotonic devices.

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