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Plasmon-Exciton Coupling Using DNA Templates MAURICIO PILO-PAIS, EVA-MARIA ROLLER, Faculty of Physics and Center for NanoScience (CeNS), Ludwig-Maximilians-Universität (LMU), Munich, Germany, CHRISTOS ARGYROPOULOS, Department of Electrical and Computer Engineering, University of Nebraska-Lincoln, Lincoln, Nebraska, USA, ALEXANDER HÖGELE, TIM LIEDL, Faculty of Physics and Center for NanoScience (CeNS), Ludwig-Maximilians-Universität (LMU), Munich, Germany — In the strong coupling regime, coherent energy exchange between plasmons and excitons is a phenomenon which displays distinct hybrid states. We employ the DNA origami technique to precisely position metallic nanoparticles in a defined spatial arrangement and fixed interparticle spacing. We adjust the plasmon resonance of the structure to accurately match the energy absorption of a molecular exciton (J-aggregate) by varying the nanoparticle diameter between 30 nm and 60 nm while keeping their separation distance constant ($\sim$ 5 nm). Using this pre-programmable self-assembly approach, we obtained strong plasmon-exciton coupling and studied farfield scattering at the single-structure level, displaying normal mode splitting up to 170 meV. The ability to custom-tune the plasmon frequency and to provide strong field confinement makes DNA-origami the ideal template to bottom-up assembly plasmon-exciton systems operating at room temperature and optical frequencies.

Mauricio Pilo-Pais
Ludwig-Maximilians-Universität (LMU

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