Abstract Submitted
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Coupling organic molecules to nanophotonic devices ALEX CLARK, Imperial College London — Dibenzoterrylene (DBT) molecules are excellent sources of photons [1-3]. However to be useful all emitted photons must be collected to a single optical mode. To do this we employ nanophotonic waveguides. Previous demonstrations have relied on coupling to evanescent fields [2,3]. I will present our work coupling DBT in nano-trenches between two ends of a waveguide, where the molecules sit at the maximum of the guided electric field. I will present simulations of this system to show high coupling efficiencies are possible ($\beta \sim 50\%$), before detailing our electron-beam lithography fabrication of silicon nitride on silica devices. We have fabricated micro-capillaries which cross at the nano-trench, into which we can flow an organic mixture of DBT and anthracene. Cooling to 4 K, we see observe lifetime-limited emission from DBT molecules in trenches. I will present our work in characterising the coupling and emission from these devices. Finally I will show that by adding tapered holes to the waveguide a nano-cavity can be formed to improve the coupling, enhance the emission rate, and make it uni-directional. [1] S. Grandi et al., Phys. Rev. A 94, 063839 (2016). [2] P. Lombardi et al., ACS Photonics 5, 126 (2017). [3] P. Türschmann et al., Nano Lett. 17, 4941 (2017).

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