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Towards the coupling of single photons from dye molecules to a photonic waveguide. CLAUDIO POLISSENI, KIANG WEI KHO, KYLE MAJOR, SAMUELE GRANDI, SEBASTIEN BOISSER, JAESUK HWANG, ALEX CLARK, EDWARD HINDS, Imperial College London — Single photons are very attractive for quantum information processing given their long coherence time and their ability to carry information in many degrees of freedom. A current challenge is the efficient generation of single photons in a photonic chip in order to scale up the complexity of quantum operations. We have proposed that a dibenzoterrylene (DBT) molecule inside an anthracene (AC) crystal could couple lifetime-limited indistinguishable single photons into a photonic waveguide if deposited in its vicinity. In this talk I describe the recent progress towards the realization of this proposal. A new method has been developed for evaporating AC and DBT to produce crystals that are wide and thin. The crystals are typically several microns across and have remarkably uniform thickness, which we control between 20 and 150 nm. The crystal growth is carried out in a glove bag in order to exclude oxygen, which improves the photostability of the DBT molecules by orders of magnitude. We image the fluorescence of single DBT molecules using confocal microscopy and analyse the polarization of this light to determine the alignment of the molecules. I will report on our efforts to control the alignement of the molecules by aligning the host matrix with the substrate.

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