

On-chip single photon emission from an integrated semiconductor quantum dot into a photonic crystal waveguide

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We demonstrate the in-plane emission of highly-polarized single photons from an InAs quantum dot embedded into a photonic crystal waveguide. The spontaneous emission rates are Purcell-enhanced by the coupling of the quantum dot to a slow-light mode of the waveguide. Photon-correlation measurements confirm the sub-Poissonian statistics of the in-plane emission. Under optical pulse excitation, single photon emission rates of up to 19 MHz into the guided mode are demonstrated, which corresponds to a device efficiency of 24%. These results herald the monolithic integration of sources in photonic quantum circuits.

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