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(G*) Hybrid Integration of III-V Nanowires Embedded with Quantum Dots on Photonic Integrated Circuits

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Quantum dots embedded in photonic nanowires are highly efficient single photon generators. Integrating such sources on-chip offers enhanced stability and miniaturization; both of which are important in many applications involving quantum information processing. We demonstrate the efficient coupling of quantum light generated in a III-V photonic nanowire to a silicon-based photonic integrated circuit. This hybrid quantum photonic integrated circuit is assembled through a "pick & place"approach using a nanomanipulator in a scanning electron microscope where the nanowires are transferred individually from the growth substrate and carefully placed onto the photonic integrated circuit. The emission properties of on-chip nanowire QDs were measured using an all-fibre pump and collection technique. We demonstrate detected count rates of a million counts per second with single photon purities higher than 95 percent thus showing that using nanowires with embedded QDs coupled to on-chip photonic structures is a viable route for the fabrication of stable single photon sources.

Authors: YEUNG, Edith (University of Ottawa); Dr NORTHEAST, David B. (National Research Council of Canada); Dr MNAYMNEH, Khaled (National Research Council of Canada); Mr LAFERRIERE, Patrick (Univeristy of Ottawa); Dr POOLE, Phlip J. (National Reseach Council of Canada); Dr WILLIAMS, Robin L. (National Research Council of Canada); Dr DALACU, Dan (National Research Council of Canada)

Presenter: YEUNG, Edith (University of Ottawa)

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