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## A photonic platform hosting telecom photon emitters in silicon

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Silicon, a ubiquitous material in modern computing, is an emerging platform for realizing a source of indistinguishable single-photons on demand. The integration of recently discovered single-photon emitters in silicon into photonic structures is advantageous to exploit their full potential for integrated photonic quantum technologies [1] [2]. Here, we show the integration of telecom photon emitters in a photonic platform consisting of silicon nanopillars. We developed a CMOS-compatible nanofabrication method, enabling the production of thousands of individual nanopillars per square millimetre with state-of-the-art photonic-circuit pitch, all the while being free of fabrication-related radiation damage defects. We found a waveguiding effect of the 1278 nm G-center emission along individual pillars accompanied by improved brightness, photoluminescence signal-to-noise ratio and photon extraction efficiency compared to that of bulk silicon. These results unlock clear pathways to monolithically integrating single-photon emitters into a photonic platform at a scale that matches the required pitch of quantum photonic circuits.

[1] Hollenbach M., Berencén Y. et al. "Engineering telecom single-photon emitters in silicon for scalable quantum photonics", *Opt. Express* 28, 26111-26121 (2020)

[2] Redjem W., Durand, A., Herzig, T. et al. "Single artificial atoms in silicon emitting at telecom wavelengths", *Nat. Electronics* 3, 738–743 (2020)

**Primary authors:** Mr JAGTAP, Nagesh Shamrao (Helmholtz-Zentrum Dresden-Rossendorf); Mr HOLLENBACH, Michael (Helmholtz-Zentrum Dresden-Rossendorf)

**Co-authors:** Dr FOWLEY, Ciarán (Helmholtz-Zentrum Dresden-Rossendorf); Mr KENTSCH, Ulrich (Helmholtz-Zentrum Dresden-Rossendorf); Dr ERBE, Artur (Helmholtz-Zentrum Dresden-Rossendorf); Prof. HELM, Manfred (Helmholtz-Zentrum Dresden-Rossendorf); Dr ASTAKHOV, Georgy (Helmholtz-Zentrum Dresden-Rossendorf); Dr BERENCÉN, Yonder (Helmholtz-Zentrum Dresden-Rossendorf); Dr LEE, Woo (Korea Research Institute of Standards and Science); Mr KIM, Hakseong (Korea Research Institute of Standards and Science); Dr SHIN, ChaeHo (Korea Research Institute of Standards and Science); Mr BARATECH, Juan (Helmholtz-Zentrum Dresden-Rossendorf); Ms GUARDIA-ARCE, Verónica (Helmholtz-Zentrum Dresden-Rossendorf); Mrs EICHLER-VOLF, Anna (Helmholtz-Zentrum Dresden-Rossendorf); Dr ABROSIMOV, Nikolay V. (Leibniz Institute for Crystal Growth)

**Presenter:** Mr JAGTAP, Nagesh Shamrao (Helmholtz-Zentrum Dresden-Rossendorf)

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