Electrically pumped photonic nanowire single-photon source with an efficiency of 89% - DTU Orbit (18/12/2018)

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We propose a new electrically-pumped single-photon source design based on a quantum dot in a photonic nanowire. For realistic parameters, the design features an efficiency of 89% predicted by numerical simulations. Unlike cavity-based designs, our approach allows for broadband spontaneous emission control and has high tolerance towards surface roughness. In the nanowire, a geometrical effect ensures good coupling between the quantum dot and the optical mode, and an inverted tapering section is introduced to adiabatically expand the mode waist and control the far field emission profile while minimizing the relative modal overlap with the metal contacts.