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Photoluminescence from oxygen-doped single-walled carbon nanotubes modified by dielectric metasurfaces XUEDAN MA, Argonne National Laboratory, STEPHEN DOORN, HAN HTOON, Los Alamos National Laboratory, IGAL BRENER, Sandia National Laboratories — Oxygen dopants in single-walled carbon nanotubes (SWCNTs) have recently been discovered as a novel single photon source enabling single photon generation up to room temperature in the telecom wavelength range.[1] While they are promising for quantum information processing, it is fundamentally important to be able to manipulate their photoluminescence (PL) properties. All-dielectric metasurfaces made from arrays of high index nanoparticles have emerged as an attractive alternative to plasmonic metasurfaces due to their support of both electric and magnetic modes.[2] Their low intrinsic losses at optical frequencies compared to that of plasmonic nanostructures provide a novel setting for tailoring emission from quantum emitters. We couple PL from single oxygen dopants in SWCNTs to the magnetic mode of silicon metasurfaces. Aside from the observation of a PL enhancement due to the Purcell effect, more interestingly, we find that the presence of the silicon metasurfaces significantly modifies the PL polarization of the dopants, which we attribute to near-field polarization modification caused by the silicon metasurfaces. Our finding presents dielectric metasurfaces as potential building blocks of photonic circuits for controlling PL intensity and polarization of single photon sources. 1. X. Ma et al. Nat. Nanotechnol. 2015, 10, 671-675. 2. I. Staude et al. ACS Nano 2013, 7, 7824-7832.

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