Abstract Submitted
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Surface Exciton-Plasmons in Carbon Nanotubes[1] IGOR BONDAREV, NC Central University, KEVIN TATUR, LILIA WOODS, University of South Florida — We study theoretically the interactions of excitonic states with surface electromagnetic modes of a single-walled carbon nanotube. We use our previously developed Green's function formalism to quantize an electromagnetic field in the presence of quasi-1D absorbing bodies [1]. We show that these interactions result in the exciton-plasmon coupling that is significant in its strength due to the presence of weakly-dispersive low-energy (∼0.5-2eV) interband surface plasmon modes [2] and large exciton excitation energies ∼1eV in small-diameter nanotubes [3]. We estimate the exciton-plasmon Rabi splitting to be ∼0.01-0.1eV which is close to that observed in organic semiconductors [4] and much larger than that reported for hybrid semiconductor-metal nanoparticle molecules [5]. We calculate the exciton absorption lineshape and demonstrate a clear line splitting effect as the exciton energy is tuned to the closest interband surface plasmon resonance.
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