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Multi-Excitonic Emission from Solitary Dopant States of Carbon Nanotubes. H. HTOON, Center for Integrated Nanotechnologies, Los Alamos National Laboratory, X. MA, N. F. HARTMANN, L. ADAMSKA, K. A. VELIZHANIN, S. TRETIAK, J. K. S. BALDWIN, S. K. DOORN, Los Alamos National Laboratory — Oxygen doping of single wall carbon nanotubes (SWCNTs) has been rapidly emerging as an effective mean for introduction of new functionalities. Recently, through demonstration of fluctuation free, room temperature single photon generation[1], we established these states as a new type of solid-state two level atom with potentials in quantum information technologies. This study further showed that while some doped tubes were characterized with a near complete photon antibunching, significant numbers of doped tubes exhibit some degree of photon bunching indicating that they emit more than one photon in one excitation cycle. Here in this work, by separating slow and fast photons in the time domain, we show for the first time that the multiple photon emissions originated from higher order multi-exciton states of solitary dopants. We also show that such multi-exciton states can allow emission of photon pairs with efficiency as high as 20-30% of single exciton emission. With this work, we bring out multi-excitonic processes of the solitary dopant states as a new area to be explored for potential applications in lasing, entangled photon generation and carrier multiplication. [1] X. Ma et al., Nature Nanotech. **10**, 671 (2015)

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