

Abstract Submitted  
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**Theory of Individual Carbon  
Nanotube Deposition by Nanoscopic Lenses**<sup>1</sup> SHENG LIU, AMIT GOYAL,  
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Institute of Technology, LINUS A. FETTER, Bell Laboratories — The accurate po-  
sitioning of an individual vertically aligned carbon nanotube (CNT) is a challenge for  
nanofabrication. We have successfully deposited individual CNTs into sub-100nm  
diameter SiN<sub>x</sub> windows on metal interconnects using electrophoresis in conjunction  
with the nanoscopic lens effect. The dynamics of the deposition of nanotubes under  
different CMOS compatible manufacturing conditions was modeled using 2D and  
3D finite element analysis. Surface charge accumulation and saturation is the key  
determinant of the strength of the nanoscopic lens. The modeling predicts that  
there is an easily obtainable range of conditions where only one nanotube will be  
deposited in round windows using current generation lithography. Deposition in a  
slotted window geometry yields a limited number of nanotubes that have an average  
spacing which is a function of the geometry of the slot and randomly approaching  
nanotubes. Early integration of vertical carbon based logic with CMOS is feasible.

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