Abstract Submitted
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Theory of Individual Carbon Nanotube Deposition by Nanoscopic Lenses[1] SHENG LIU, AMIT GOYAL, ZAFAR IQBAL, GORDON A. THOMAS, REGINALD C. FARROW[2], New Jersey Institute of Technology, LINUS A. FETTER, Bell Laboratories — The accurate positioning of an individual vertically aligned carbon nanotube (CNT) is a challenge for nanofabrication. We have successfully deposited individual CNTs into sub-100nm diameter SiN_x 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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