

## Keith Williams (Delft) Assembly of Nanotube-based Electronic Devices by Biomolecular Recognition

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Nanotube, DNA linker, thiol linker to gold contacts: most important feature is "reconfigurability". Getting nanotubes to stick to substrate is easy, to come off has not been solved. Covalent chemistry approach with the following motivation: miniaturization, hands-free bottom up assembly with a high degree of perfection. Focus on bio-aspects of assembly: biology provides unique tools for assembly, ordering, and replication. The interface between biology and physics is interesting, and needs to be explored in greater depth. Introduction to PNA properties: "pseudo-peptide" backbone has no charge unlike the phosphate groups. PNA can have solubility problems and higher  $T_m$  than DNA. Single stranded DNA likes to wrap around nanotubes. Amide linkage of PNA to nanotubes: undertake Watson-Crick hybridization of DNA to PNA adducts on nanotubes. Present AFM evidence for the tubes, noteworthy that DNA, though larger than tubes ends up collapsing on mica. Current, optimized amide linkage of PNA to Nano tubes improves the yield. The "nanosperm": an attachment at one end of the nanotube with the DNA. Possible reasons for these effects include nonspecific binding, side reactions with exocyclic amines, water-solubility spacer needed. SWNT attachment to Protected PNA-Resin: adducts can be counted by UV to test for loading of Fmoc, now in process, fluorescence labeling. Now, attaching onto gold and hybridize onto the DNA. Also looking at intermediate linkers such as gold nanoparticles, evaluated with physical absorption.