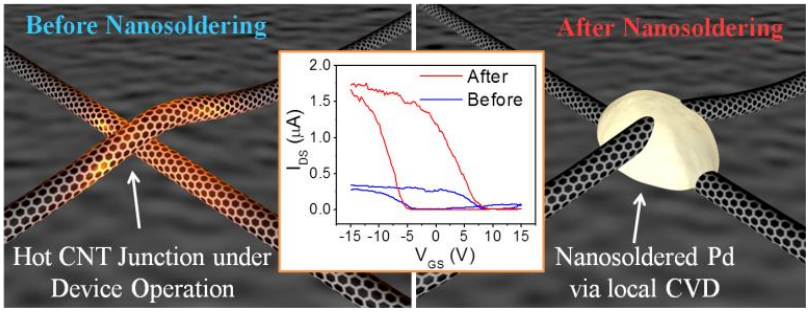
NANOHOUR

Monday, December 9, 2013 2:00 pm
Beckman Institute - Room 2269

Nanosoldering Carbon Nanotube Junctions by Local Chemical Vapor Deposition for Improved Device Performance

Jae Won Do, Electrical and Computer Engineering
Graduate Student with Professor Joseph Lyding

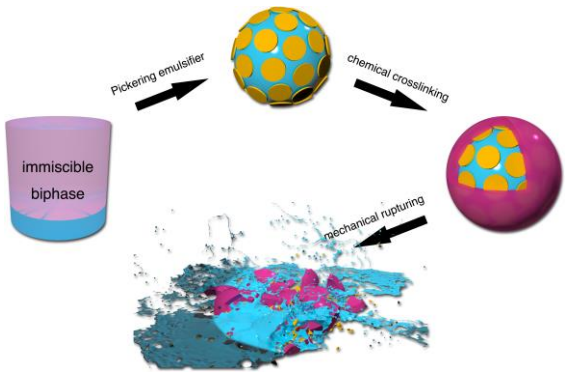


Carbon nanotube network (CNN) devices are useful in integrated circuits and display drivers, particularly in applications that make use of thin film transistors (TFTs) on flexible or transparent substrates. However, the performance of CNN devices is usually limited by the high electrical and thermal resistances at the individual nanotube junctions (NJs). In this study, we present a novel method to improve such resistances by depositing metal at highly resistive NJs using a localized chemical vapor deposition (CVD) process. By passing current through the devices, we induce nanometer scale heating at the NJs. This is done in the presence of metal CVD precursors in a vacuum environment, enabling the selective deposition of metal to *nanosolder* the NJs. The effectiveness of this nanosoldering process depends on the metal work function, and it can improve the on/off current ratio of a CNN device by nearly an order of magnitude. This technique could also be applied to other device types where nanoscale resistance components limit overall device performance.

Efficient Encapsulation of Hydrophilic Actives including Aliphatic Amines

Jun Li, Chemistry
Graduate Student with Professor Jeffrey Moore

Emulsion templated encapsulation processes relying on interfacial polymerization and formalin (e.g. urea-formaldehyde) shell chemistries have been extensively employed for the encapsulation of hydrophobic actives. There are far fewer examples of inverse emulsion templated encapsulation of hydrophilic actives, and aliphatic amine species have proven to be especially resistant to encapsulation due to their nonspecific solubility profile (good solubility in most organic solvents and neutral water) and a nucleophilic and basic character that interferes with standard shell forming reactions. We will report a method for the encapsulation of aliphatic amines from inverse Pickering emulsions using interfacial polymerization to form the shell. Characterization of the capsule shells and encapsulation efficiency (nearly quantitative) will be discussed. The understanding of fundamental basics of encapsulation technique will help us design feasible systems for encapsulation of polar actives and seek their application in drug delivery, catalysis, *et cetera*.



Coffee and cookies will be served
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