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Selective Chemical Functionalization for the Fabrication of Single-Walled Carbon Nanotube Devices GEORGE TULEVSKI, ALI AFZALI, PHAEDON AVOURIS, JAMES HANNON, IBM T.J. Watson Research Center — Single-Walled Carbon Nanotubes (SWCNTs) have attracted enormous interest due to their excellent electronic properties. The integration of SWCNTs into technologically relevant architectures is limited by the processing techniques available to address numerous integration challenges such as selective placement, doping and separation by electronic type. This talk will focus on using chemical methods to address the separation challenge by selectively functionalizing the metallic SWCNTs to fabricate field-effect transistors consisting of multiple SWCNTs. The process begins with a large-scale, low-loss purification of SWCNTs using a density step-gradient to allow for characterization of SWCNTs in large quantities. Once the material is purified, functionalized diazonium salts are used to selectively react with the metallic SWCNTs. Multiple SWCNT devices are then prepared and result in dramatically improved switching behavior. Methods to exploit the selective functionalization as a means of physically separating the material will also be discussed.

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