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Controlling the kink angle of intramolecular carbon nanotube junctions: A combined experimental and theoretical study JAN BLUEHER, JENS KUNSTMANN, IMAD IBRAHIM, Dresden University of Technology, Germany, ALICJA BACHMATIUK, FELIX BOERRNERT, MARK RUEMMELI, IFW Dresden, Germany, GIANAURELIO CUNIBERTI, Dresden University of Technology, Germany — Intramolecular carbon nanotube (CNT) junctions are nanotubes with kinks generated by heptagon-pentagon defect pairs. They are very attractive functional building blocks for future electronics, as they can be used as diodes and transistors. Usually CNT junctions are synthesized incidentally [1]. Using chemical vapor deposition techniques we are trying to grow CNT junctions in a more controlled way. In particular, we want to control the kink angle in order to produce junctions with well defined electronic properties. Our approach raises the question: Are there special kink angles that induce a certain change in electronic properties? In order to answer this question we developed a scheme that allows generating the atomic structure of CNT junctions with an arbitrary number of heptagon-pentagon defects. To break down the large number of different geometrical possibilities to achieve a CNT junction with a specific angle we study the energetics of different defect combinations and discuss the implication of these results for the experimental realization of well defined CNT junctions. [1] Wei et al., Adv. Mater. 20, 2815 (2008).

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