High resolution transmission electron microscopy (HRTEM) has allowed the imaging of atomic-scale defects in graphene [1] and other materials. At the same time interesting atomic-scale processes – induced by the imaging electrons while they traverse the sample – have been revealed. We have studied these effects combining HRTEM and density-functional theory-based computer simulations and demonstrated, .e.g, amorphization of graphane [2], bond-rotation-driven migration of defects [3], edge transformations [4] and shrinkage of small grains until disappearance.
Graphene also serves as the perfect membrane for ion irradiation of volatile samples. However, the usability of such a membrane depends heavily on its irradiation response. At the same time ion beams can be used to dope and/or cut this material. All of these issues can be studied applying atomistic simulations [5-7], as will be described in the second part of this presentation.

[1] ACS Nano 5, 26-41 (2011)
[2] Phys. Rev. Lett. 106, 105505 (2011)
[3] Phys. Rev. B 83, 245420 (2011)
[4] ACS Nano, doi: 10.1021/nn204148h
[5] Phys. Rev. B 81, 153401 (2010)
[6] Nanotech. 22, 175306 (2011)
[7] Phys. Rev. B 83, 115424 (2011

## TUE 7
## Diameter specific growth of sub-nm thin SWCNT

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The bulk scale separation of SWNT is a major breakthrough in nanotechnology. Concerns on achievable purity and efficiency stimulate ever more demand for the enriched growth of specific chiralties.
Conventional wisdom dictates that the diameter control in the CVD growth of SWCNT requires in some way control of the catalyst morphology. The use of acetonitrile/ethanol mixed feedstocks is a noteworthy exception to that rule.

We quantitatively correlate drastically reduced mean diameters with the incorporation of substitutional $sp^2$ nitrogen [1]. Growth stemming from the pores of zeolite yields very narrow diameters. Still, the mean diameter as well as the distribution width are significantly further reduced upon adding acetonitrile to the ethanol feedstock. Combined Raman and PLE mapping evidence on the bulk scale specific enrichment for the abundance of individual chiralities.

[1] T. Thurakitseree et al. Carbon, submitted