Electronic transport in carbon nanotube-graphene junctions

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We have studied electronic transport through individual metallic carbon nanotube (CNT)-graphene junctions produced by atomic force microscope nano-manipulation. While our models demonstrate that a CNT has a very limited influence on the graphene sheet, i.e. that the charge transfer occurs only over few atomic raw [1], our electronic transport experiments show that the junction transparency is strongly gate-tunable depending on the resistance of the junction itself. We also observe that the junction resistance does not depend on the CNT-graphene overlapping distance. We explain the strong gate dependence of the resistance by the charge induced variation of the CNT-graphene distance. The absence of the junction length dependence of the resistance indicates that the charge injection occurs via a single point most likely to be at the end of the CNT [2].

[1] P.T. Robert, A. Durand, and R. Danneau, unpublished.
[2] P.T. Robert, R.-J. Du, F. Wu, F. Hennrich, M.M. Kappes, H.v. Löhneysen and R. Danneau, unpublished.