Open post-doctoral position:

Probing the optoelectronic properties of single conductive oligomers and graphen nano-ribbons with LT-STM.

Electronic and optoelectronic properties of nanoscale one-dimensional structures such as carbon nanotubes, graphene nano-ribbons (GNRs) or conjugated polymers are central to many fundamental and applied studies. In recent years, new methods have enabled atomic-scale studies of organic 1D structures with low temperature scanning tunneling microscopy (LT-STM). Based on an on-surface polymerization approach[1], these studies have revealed fascinating aspects of GNRs[2] and of various other molecular wires[1,3]. We showed that the electronic structures of short linear polymers (or oligomers) of thiophene could be approximated by a (nearly) free electron gas confined to a 1D box, while nano-rings made of the same material revealed unexpected electronic resonances[4]. We then studied the electroluminescent properties of polythiophene wires suspended between a metallic surface and the tip of our LT-STM, and discovered that this molecular junction behaves as a single-molecule LED[5].

The aim of the project is to extend this study to organic polymers having specific properties. The first step will consist in probing the electronic and optoelectronic properties of GNRs of different widths synthesised on a metal surface. This should allow the first electroluminescent measurements of an individual GNR. Other highly conjugated ribbons will also be probed following this approach.

The candidate should be a highly motivated physicist with a PhD in the field scanning probe microscopy (STM and/or AFM). Competences and knowledge in molecular electronics, optics, low temperature equipments and ultra-high vacuum would be valuable.

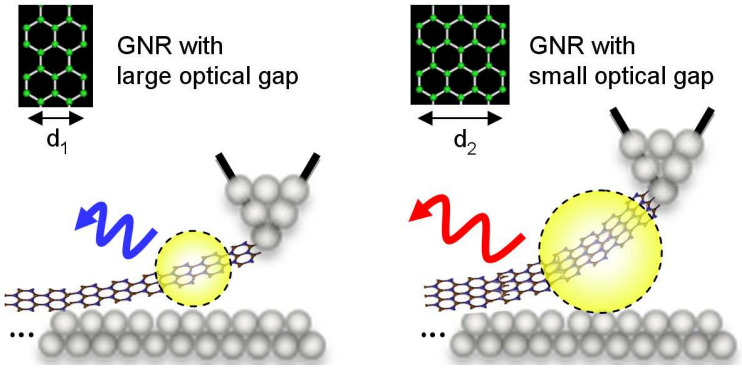

Figure 1: Probing the electroluminescence of individual GNRs as a function of their widths.

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References:
[1] Lafferentz *et al.* Science **323**, 5918 (2009).
[2] Koch *et al.* Nature Nanotech. **7**, 713 (2012).
[3] Wang *et al.* Phys. Rev. Lett. **106**, 206803 (2011).
[4] Reecht *et al.* Phys. Rev. Lett. **110**, 056802 (2013).
[5] Reecht *et al.* Phys. Rev. Lett. **112**, 047403 (2014).