THIN AND CONTINUOUS DNA-TEMPLATED METALLIC NANOWIRES.

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Nanotechnology aims to produce and manipulate well-defined structures at the nanoscale level with high accuracy. However, nowadays is well admitted that conventional technologies based on the "top-down" approach are foreseen to experiment difficulties due to various physical effects that do not scale properly, and most important, related to the cost issues of the fabrication processes at the nanoscale dimension. This is a prompt for the study of new methodologies based on bottom-up approaches. In this framework, DNA molecule is of particular interest since, thanks to its unique intra- and intermolecular recognition properties, it has been already used to build-up nanostructures[1,2] or scaffolds for nanoparticles assembly[3] and it can be envisioned for the assembly of devices. Our ambition is also to utilize DNA not only as a positioning scaffold for nanodevices but also as a conducting element. In order to ensure good DNA transport properties when this molecule is deposited on dry substrate like in nanodevice configuration we found that the best way is to perform its metallization.

Here we report a method based on Electroless Plating of platinum ions which bind to DNA bases and serve as catalytic spots for further metal growth[4]. The key point is to develop a technique to metallize only after having deposited the DNA on the substrate. This is indeed essential since DNA loses its recognition properties after the metallization step. Therefore the process should be performed on a surface which can be directly used for Molecular Electronics. Furthermore we manage to create the thinnest possible (see *Fig. 1)* but still continuous nanowires avoiding parasitic surface metallization by appropriate substrate treatments. In conclusion, we report about the production of thin, regular, tunable and continuous nanowires (see example in *Fig. 2).*

References:

[1] N. C. Seeman, Nature **421** (2003), 33-37
[2] N. C. Seeman, Nanotechnology **2** (1991), 149-159
[3] C. A. Mirkin, Inorg. Chem. **39** (2000), 2258-2272
[4] J. Richter, M. Mertig, W.Pompe, I. Mönch, H.K. Schackert, App. Phys. Lett. **78** (2001), 536

Figures:

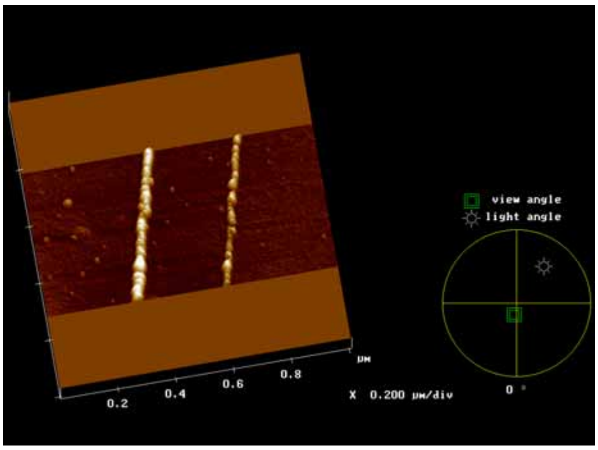

Fig.1. AFM of two platinated DNA-based nanowires

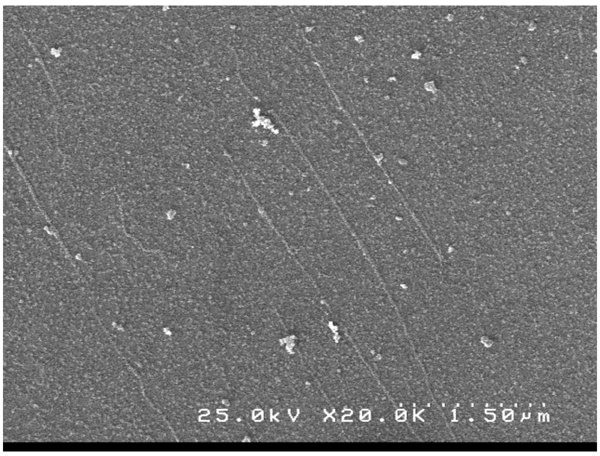

Fig. 2. SEM of combed and metallized λ_DNA

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