

## TEMPLATE SYNTHESIS OF NANOMATERIALS

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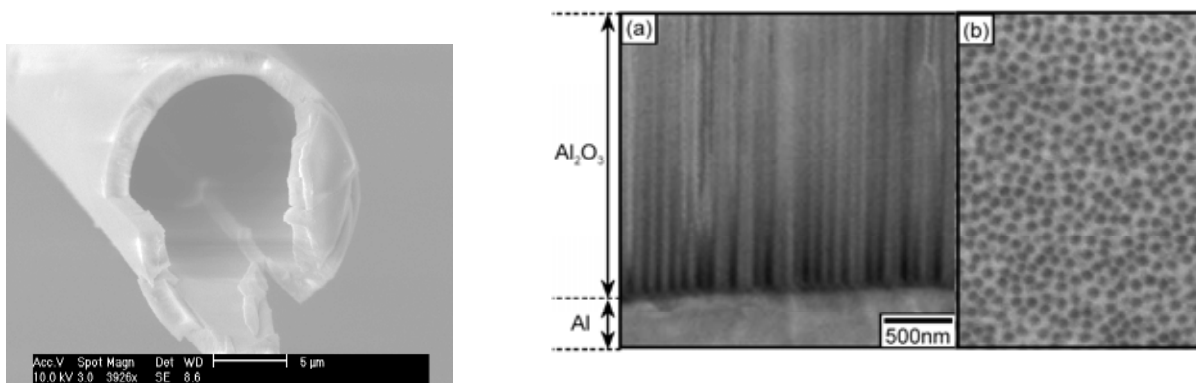
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Template synthesis allows a large variety of nano-devices to be fabricated in the laboratory at a very low cost [1]. This technique uses a nanostructured template in which various deposition processes, like electrodeposition and CVD, are performed *in situ*.

Some processes are presented that enable the fabrication of functionalised devices used in the context of our research in *spintronics* and *nanoelectronics*. The fabrication of different templates, like polycarbonate membranes or alumina membranes, is described. The fabrication of single contacted nanowires by electroplating is presented for various kinds of materials and morphologies: metallic, semiconductors, oxides, homogeneous layers, multilayers, or granular. The fabrication of carbon nanotubes with electroplating and CVD inside the template is also presented. A comparative study between the different structures shows that the main electronic properties are governed by the Coulomb blockade effect (with a typical scaling low) instead of intrinsic band structures. Weak localization is also systematically observed and the electronic coherence length can be deduced.

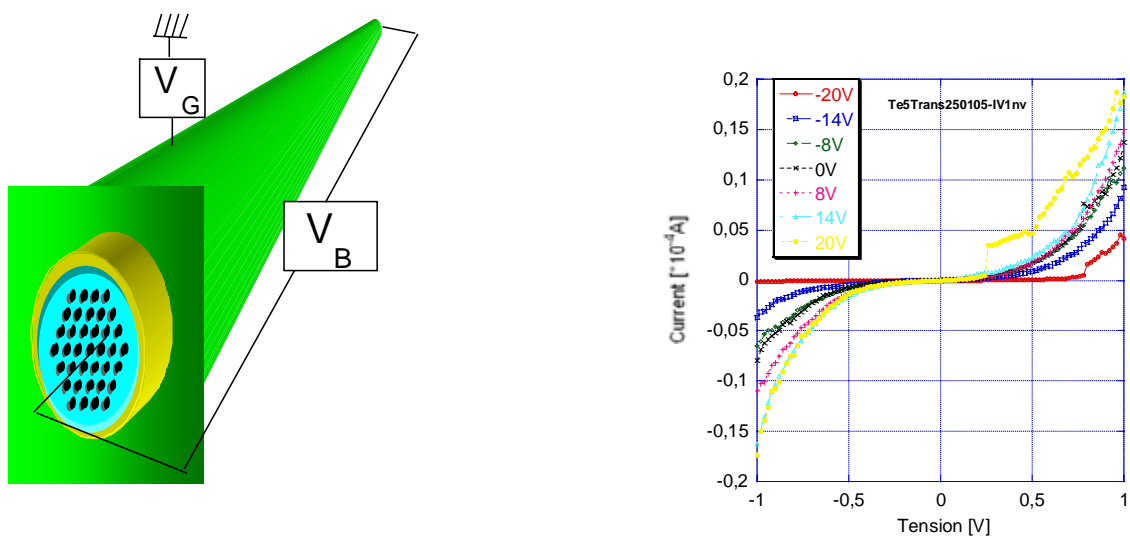
It is shown that the use of anodized Al templates in a cylindrical geometry allows a series of nanotransistor to be fabricated without a clean room or lithography. Some typical characteristics due to field effect on the nanowires drain-source behaviour are shown.

Fig. 1



Cylindrical nanostructured Al template with anodized surface. The array of nanowires is anodized in a second step along the cylinder axis. The gate is deposited on the surface.

Fig 2



Schematic of the template synthesized nanotransistor and I-V characteristic for various gate voltages at room temperature.

[1] T. Wade, J.-E. Wegrowe, « Template synthesis of nanomaterials », Eur. Phys. J. Appl. Phys. 29, 3 (2005).