# Manufacturing

## Univ. of Louvain: Aligned organic nanowires

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**Towards organic nanowires with electro-optical properties**

This paper [1] from the **University of Louvain** demonstrates that arrays of nanowires of conjugated polymers can be easily produced by a simple embossing protocol, compatible with very large scale integration technology. The embossing process is shown to have the supplementary virtue to increase the internal degree of order of the nanowires, significantly enhancing their performance. This is applied to the fabrication of nanowire-based devices consisting of a liquid crystalline light-emitting polymer, of a liquid crystalline semiconducting polymer, and of an amorphous conducting polymer, illustrating the versatility and wide applicability of the method. More detailed informations about the method and physics behind can be found in [2].

It is demonstrated that the residue-free embossing of liquid crystalline and amorphous conjugated polymers provides a new simple but versatile approach to the massive fabrication of arrays of organic nanowires of highly controlled internal degree of order. This improved degree of order translates into desirable properties, such as higher conductivity and carrier mobility, or polarized luminescence.

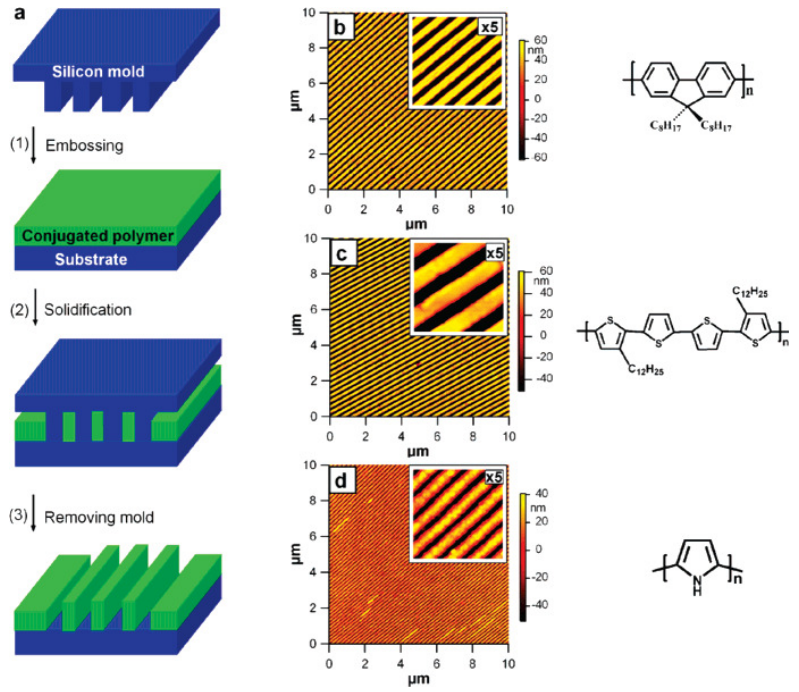


**Figure 1: Fabrication of arrays of nanowires of conjugated polymers with internal preferential internal alignment.**
**(a) Schematic outline of the process.**
**(b-d) AFM topography images of nanowire arrays and chemical structures of the polymers.**
**(b) Photo- and electroluminescent poly(9,9-di-*n*-octyl-2,7-fluorene) (PFO)**
**(c) Semiconducting poly(3,3'''-didodecyl-quaterthiophene) (PQT)**
**(d) conducting polypyrrole (PPy).**
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Other properties such as mechanical properties are expected to be improved as well, although this was not the purpose of the present paper. Considering the extreme simplicity of the process, the large range of substrates compatible with it, and the benefits brought by the improved degree of internal order, we expect the method to find widespread use for the fabrication of cheap plastic-based nanodevices, including not only those suggested by the systems reported here but also others such as feedback lasers, photodetectors, light-emitting diodes, and high-sensitivity sensors. Residue-free embossing of functional materials could potentially lead to rapid, high throughput and low-cost fabrication of nanoscale organic devices and circuits.

The paper doesn't describe how the wafer is treated before spincoating of functional materials.

[1] "High-throughput fabrication of organic nanowire devices with preferential internal alignment and improved performance" ; Z. Hu, B. Muls, L. Gence, D.A. Serban, J. Hofkens, S. Melinte, B. Nysten, S. Demoustier-Champagne, A.M. Jonas : ***Nano Letters*** **7**, 3639 (2007).
[2] "Capillary Force Lithography: Large-Area Patterning, Self-Organization, and Anisotropic Dewetting" ; K.Y. Suh, H.H. Lee : ***Advanced Functional Materials*** **12**, 405 (2002).