Fabrication of Polymer Micro and Nano Wires

BACKGROUND
Fabricating micro and nanostructures is the key to perform many fundamental scientific experiments or variety of applications at small scale. Typically metals, silicon and other inorganic materials and their combinations are used for fabricating structures by top-down approach. These processes are both expensive and challenging to process. Conducting polymers offer an alternative inexpensive way of fabricating nanostructures. These polymers have already been shown to be useful in variety of applications at macro scale like anti-static substances, electromagnetic shields and smart windows. The goal is to take the advantages of these polymers to the micro and nanoscale.

CHALLENGE / SCIENTIFIC QUESTION
Is it possible to make micro and nanostructures bottom-up using nanotools like atomic force microscope cantilever?

YOUR TASKS
• Identify the best conducting polymer based on their physical and chemical characteristics suitable for processing with nanotools
• Develop procedures to electropolymerize polymers using AFM cantilever
• Use our novel hollow AFM femtopipettes for fabricating nanowires
• Grow 2D and 3D polymer nanowires
• Characterize the polymer wires for their electrical and mechanical properties
• Analyze and interpret experimental test results and write a high-standard MSc thesis.

OPPORTUNITIES
• Work on an innovative and multidisciplinary research topic
• Hands-on-experience with nanotools like atomic force microscope and hollow microcantilevers
• Experience with scanning electron microscope and conducting polymer technology
• Gain expertise in bottom-up fabrication process
• Learn to give scientific presentations and professionally publish your work

Scanning electron image of conducting polymer 3D wires of different sizes and shapes [1]

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