

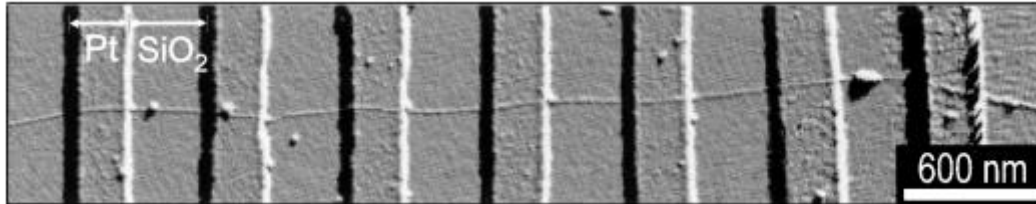
A scanning electron microscope (SEM) image showing a complex, interconnected network of nanofibers. The fibers are thin and appear to be randomly oriented, forming a dense, porous structure. The background is dark, making the light-colored fibers stand out.

NanoManufacturing

IfM Briefing Day 2015

Dr. Michael De Volder

Carbon Nanotubes Hype or Reality?

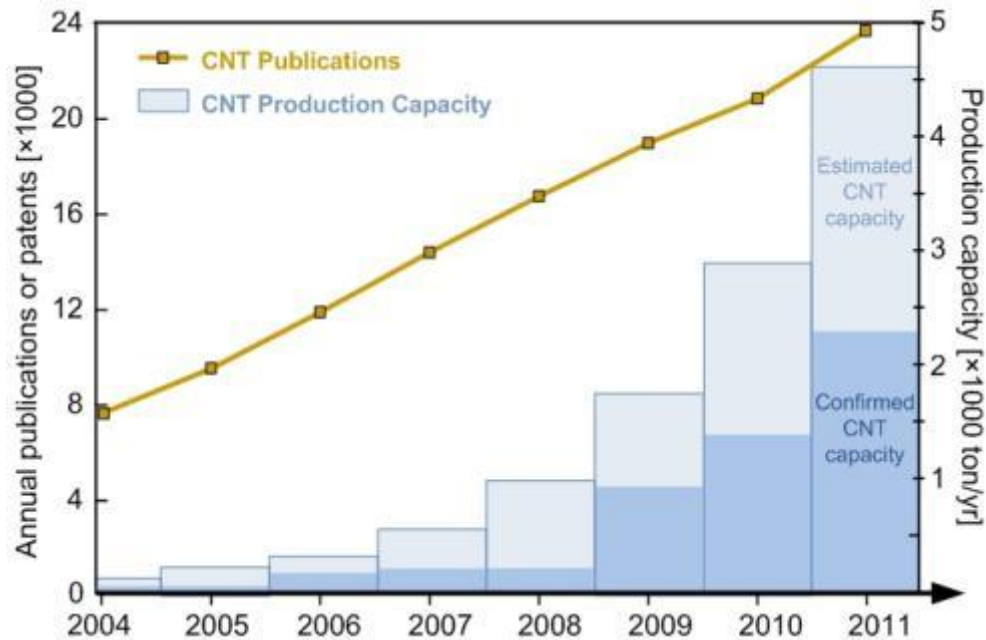


[Bezryadin et al., PRL, 1998]

- Young's modulus: 1 TPa
- Tensile strength: 100 GPa
- Current density: 10^9 A/cm²
- Thermal conductivity: 3500 Wm⁻¹K⁻¹



CNT production volume and cost



[De Volder et al., Science, 2013]



[60 kg CNT bag – Nanocyl]

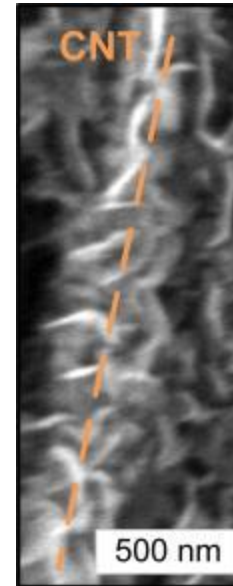
Nanoscale Modification

[M. De Volder, Unpublished]

Hydrothermal branching:



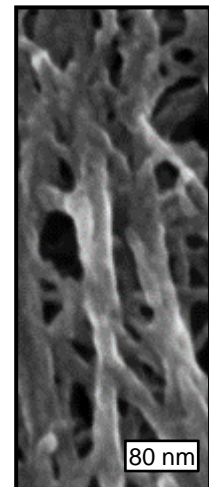
CVD deposition of graphene:

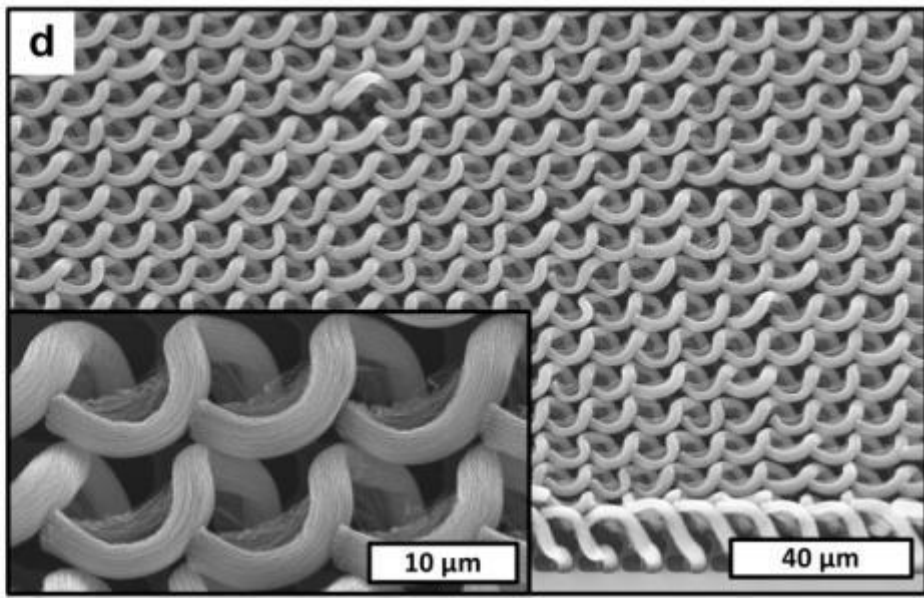
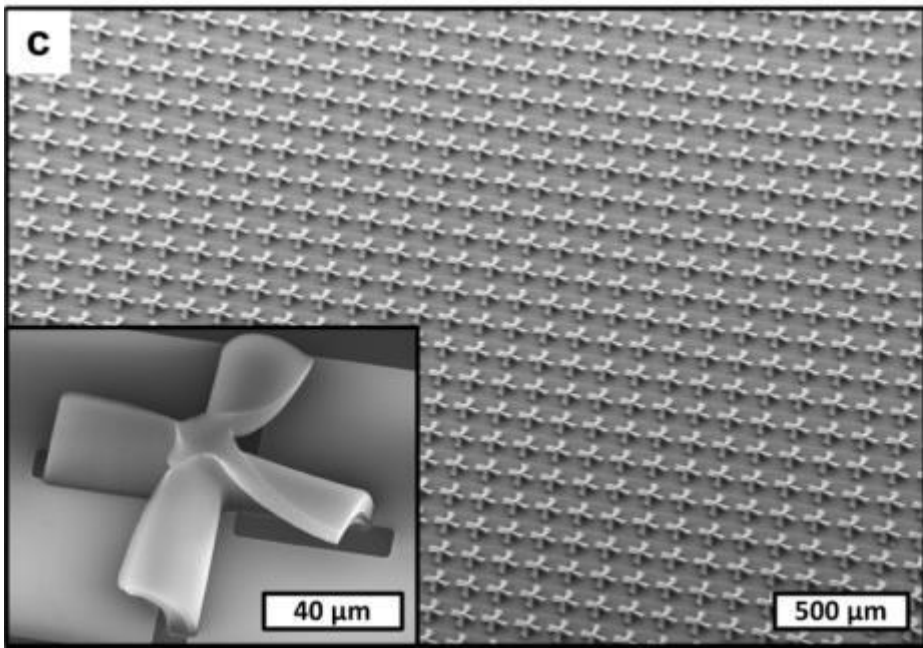
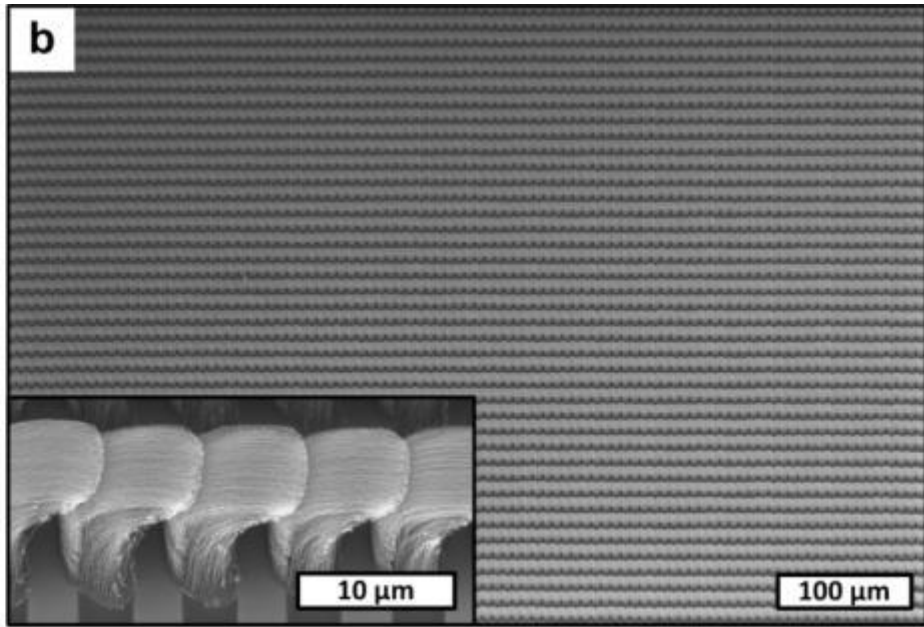
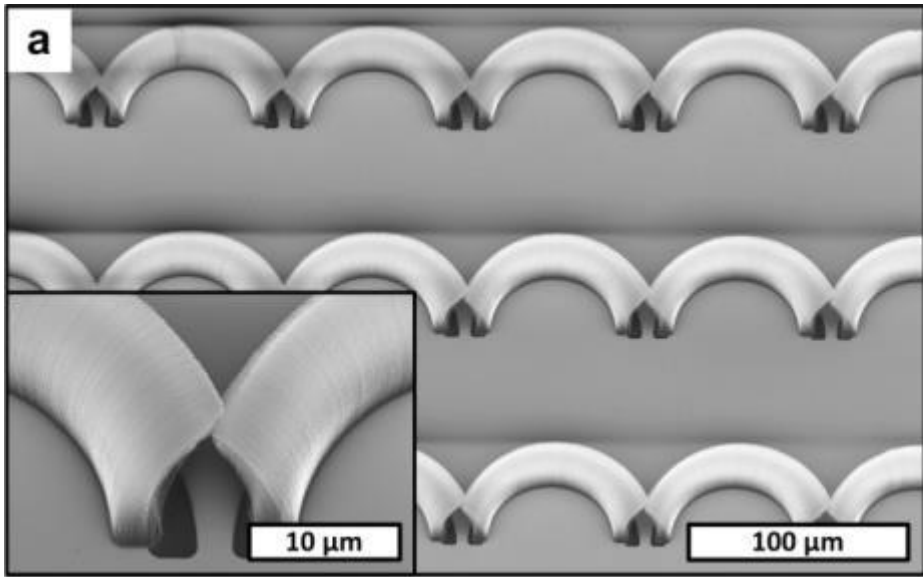


Solvothermal metal oxide decoration:

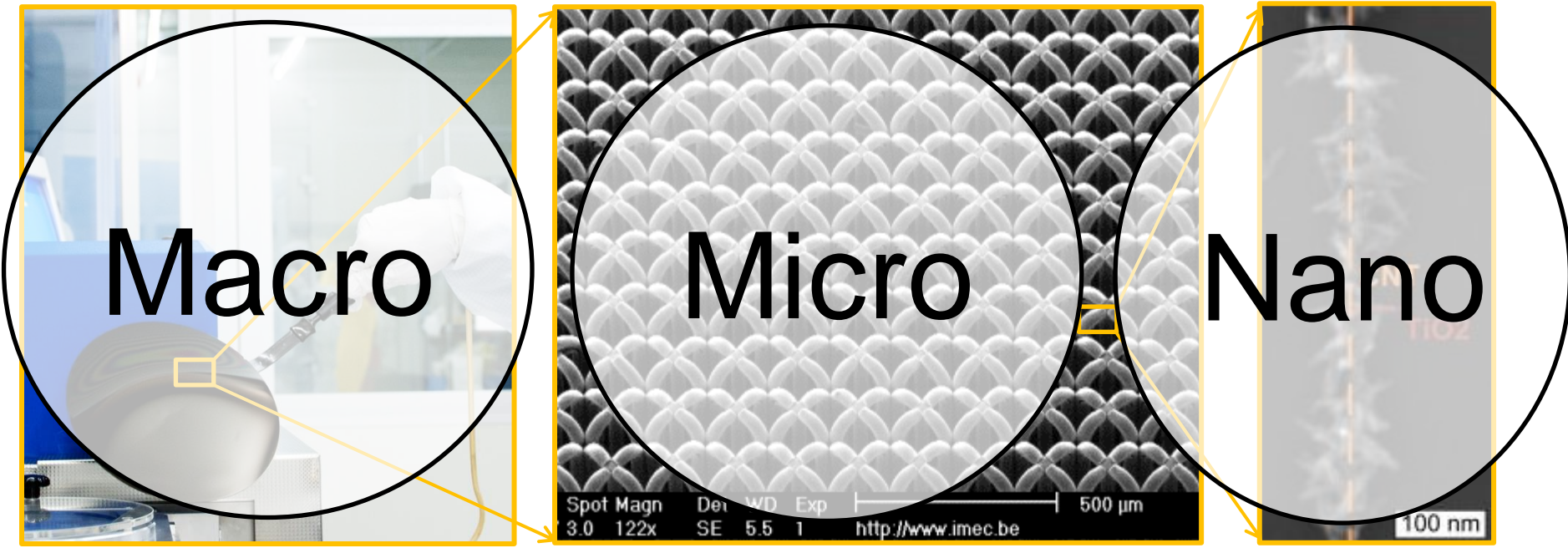


Atom Transfer Radical Polymerization:





Overview

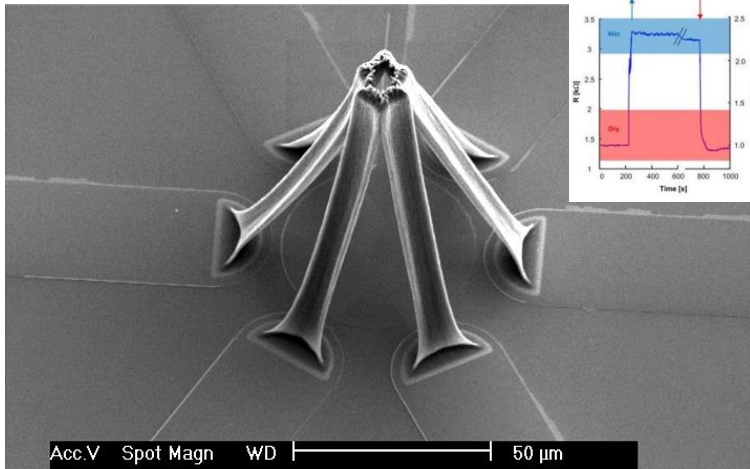


Applications:

- MEMS
- Sensors
- Structural mechanics
- Energy Storage
- Catalysis
- Filtration

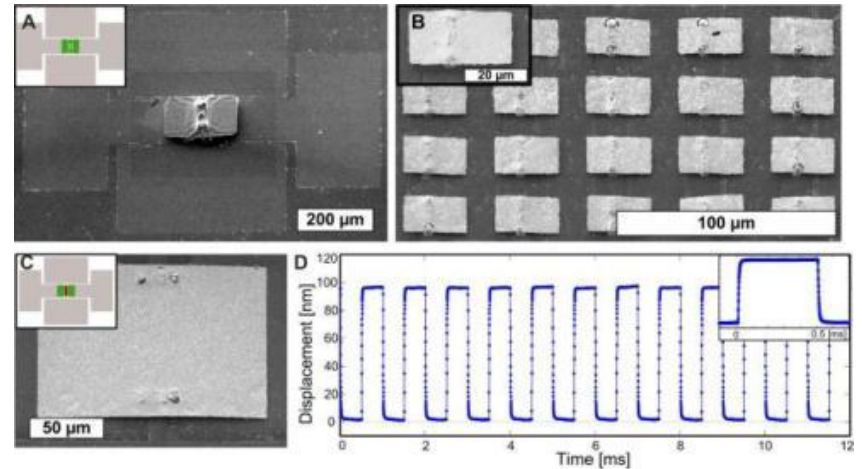
Applications

Sensors



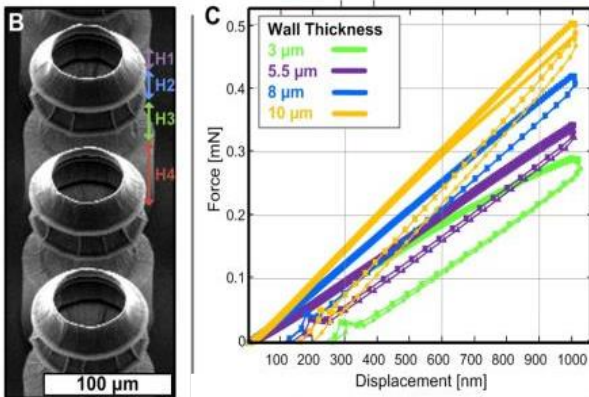
[M. De Volder et al., *Soft Matter*, 2011]

MEMS



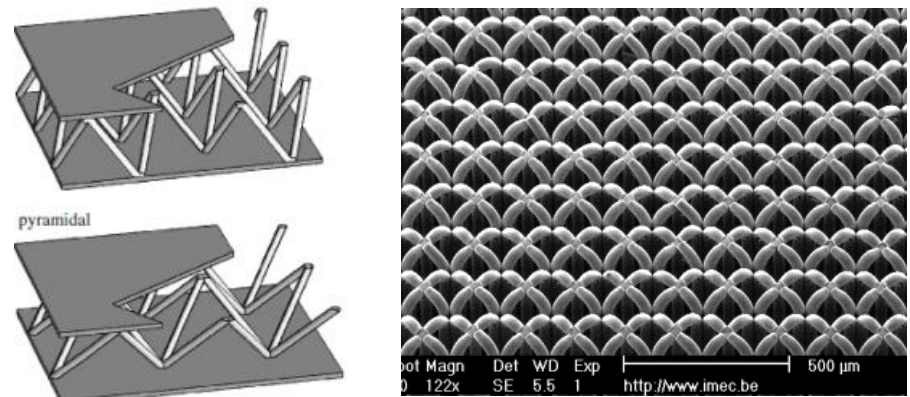
[M. De Volder et al., *Small*, 2012]

MEMS



[M. De Volder et al., *ACS Nano*, 2011]

Structural mechanics



[S. Park et al., *ACS Nano*, 2013]

Research Support

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