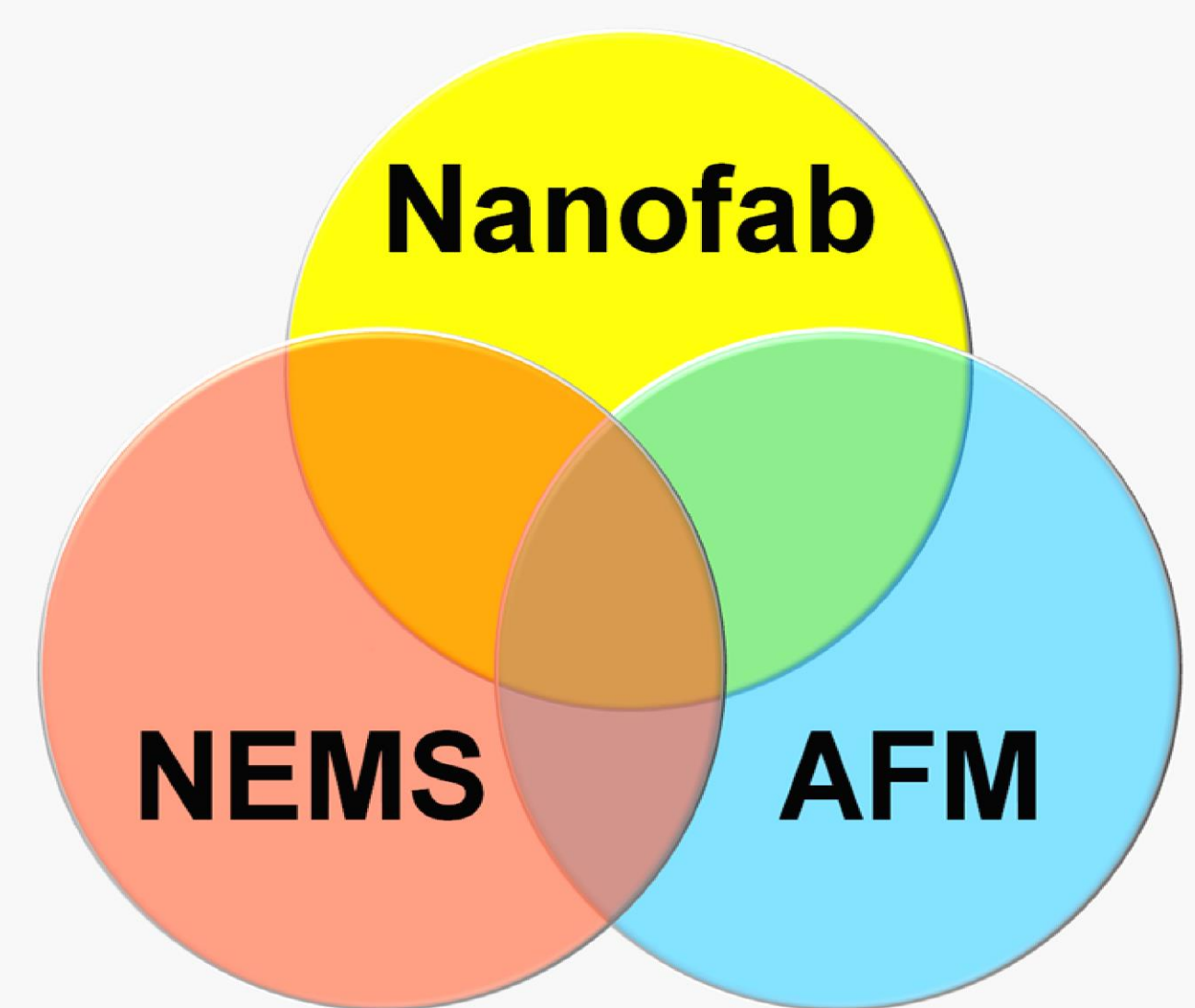


NEMS and Nanofabrication

SCOPE

Research on nanomechanical and nanoelectronic structures and devices applicable in miniaturized integrated systems: nanofabrication technologies, advanced AFM methods and functional properties

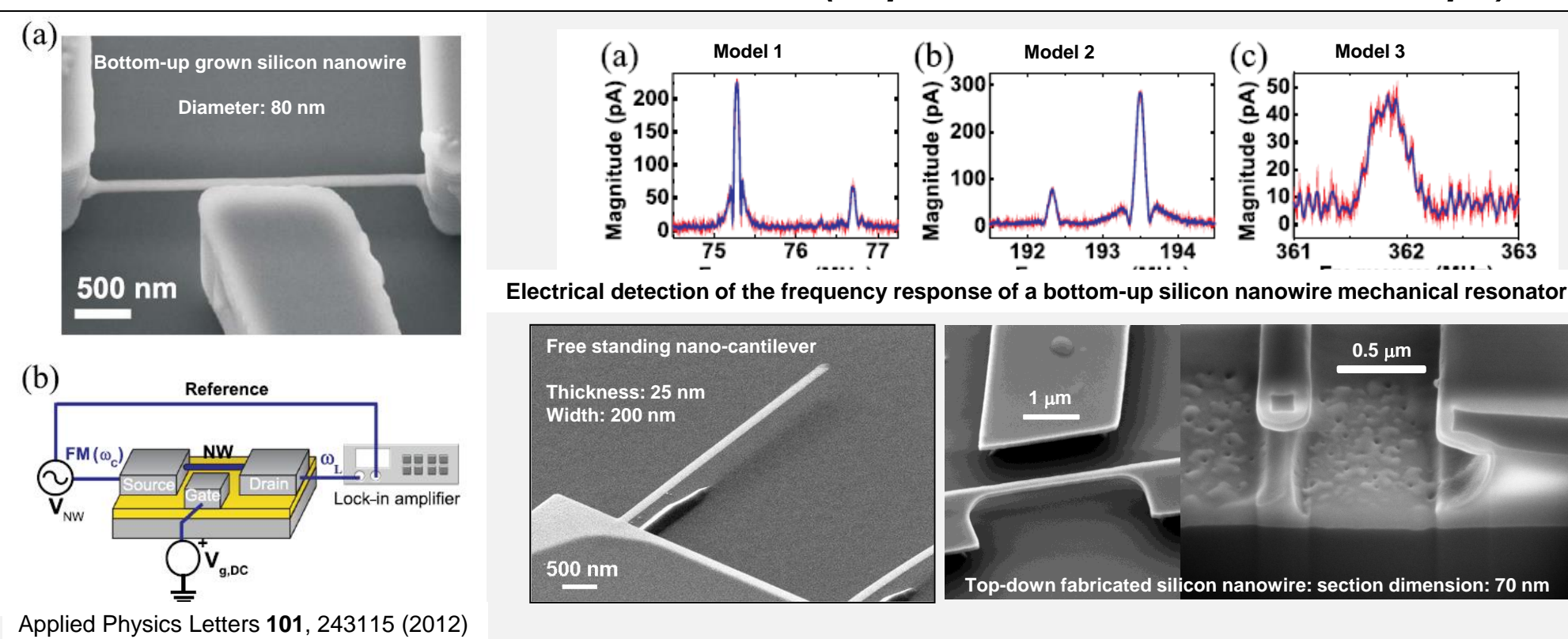


NEMS

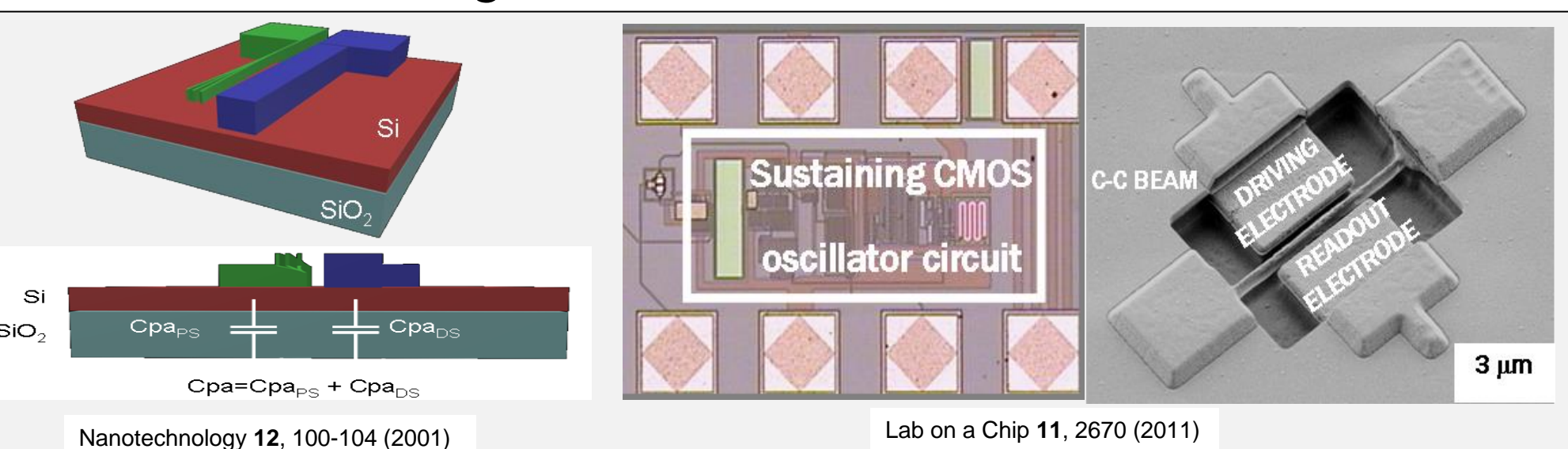
Nanomechanical resonators

Silicon nanowires present outstanding properties as mechanical resonators. We have developed processes to fabricate top-down and bottom-up nanowires, and methods to monolithically integrate nanomechanical resonators in CMOS circuits.

Silicon nanowire resonators (top-down and bottom-up)

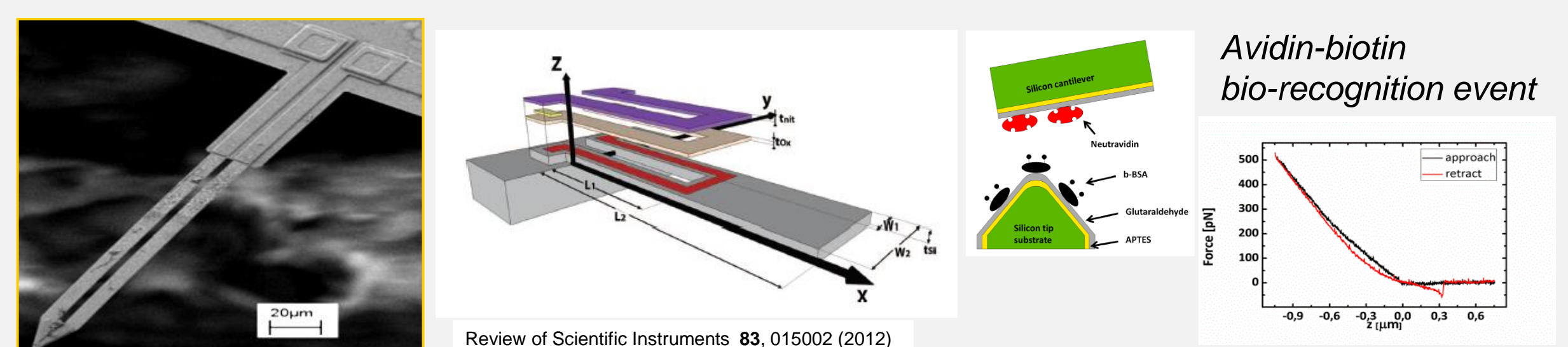


CMOS integrated nanomechanical resonators

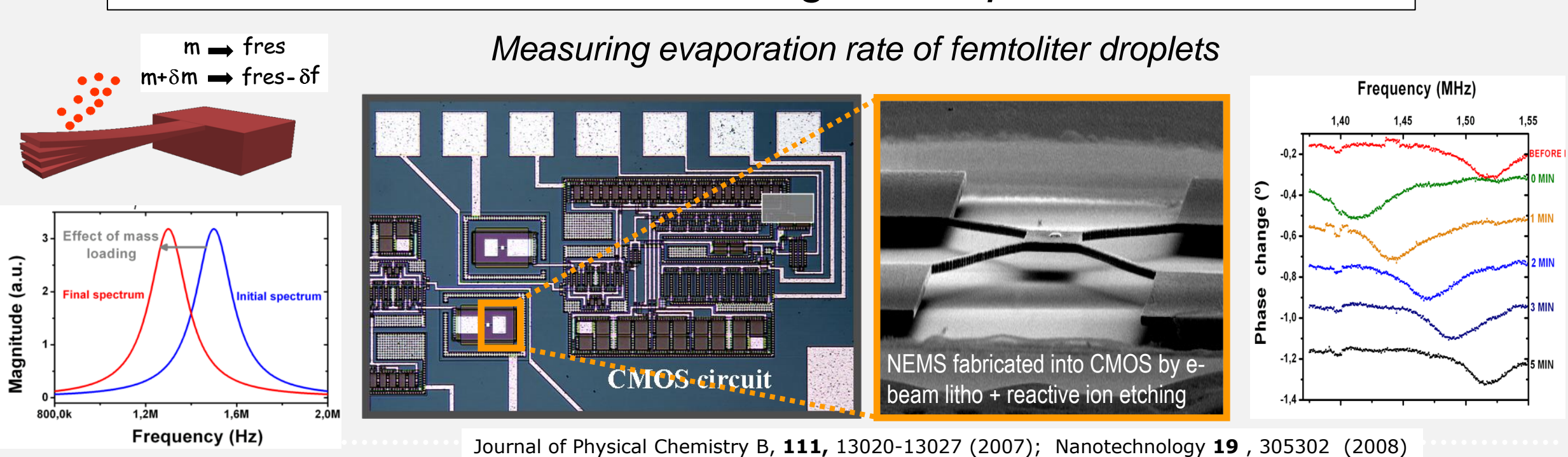


Mechanical structures and devices at nanometer scale present enhanced performance as functional sensors. Transduction of the mechanical signal into electrical signal requires smart nanosystem designs.

Piezoresistive cantilevers for biomolecular recognition



Nanomechanical mass sensing with capacitive detection

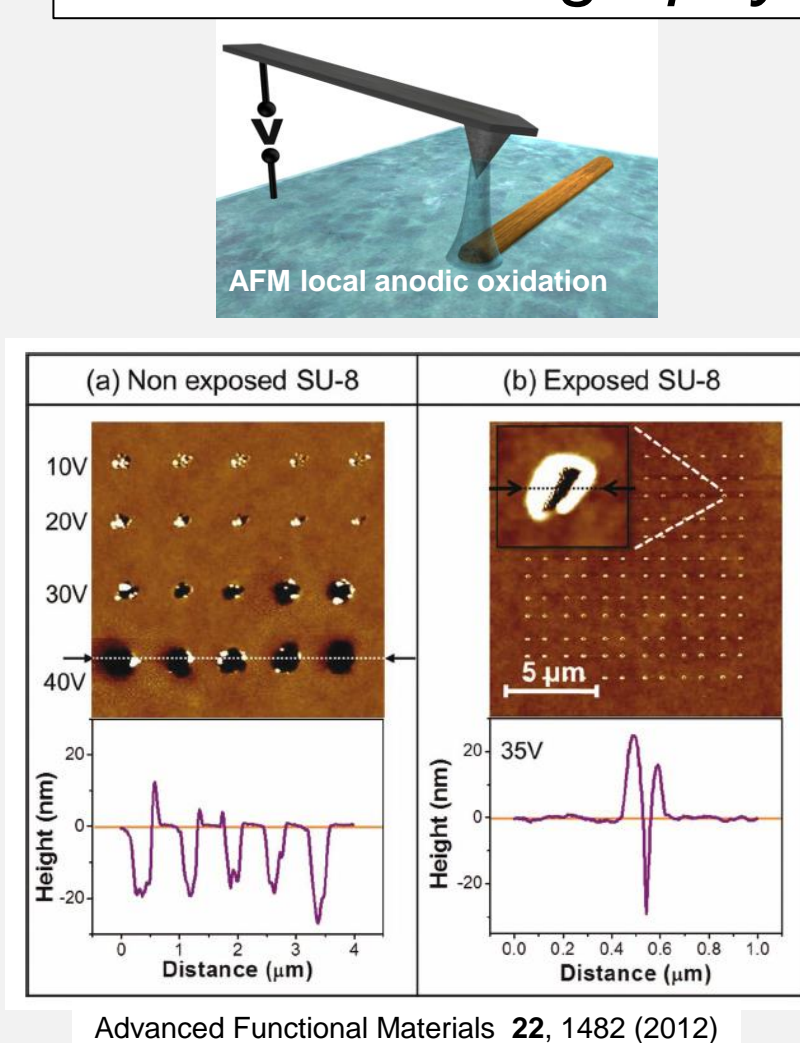


Nanofabrication

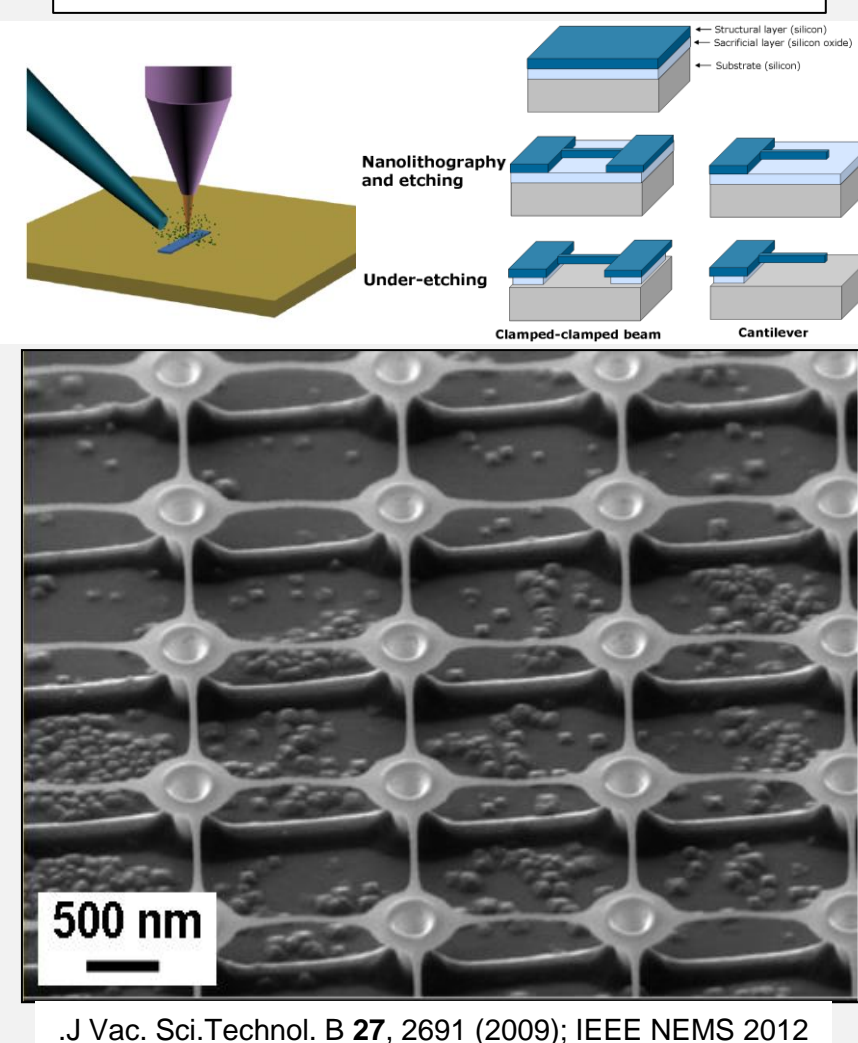
Top-down nanofabrication

We develop novel methods based on emerging nanolithographies to fabricate nanometer scale structures and devices of interest for integrated micro/nano systems.

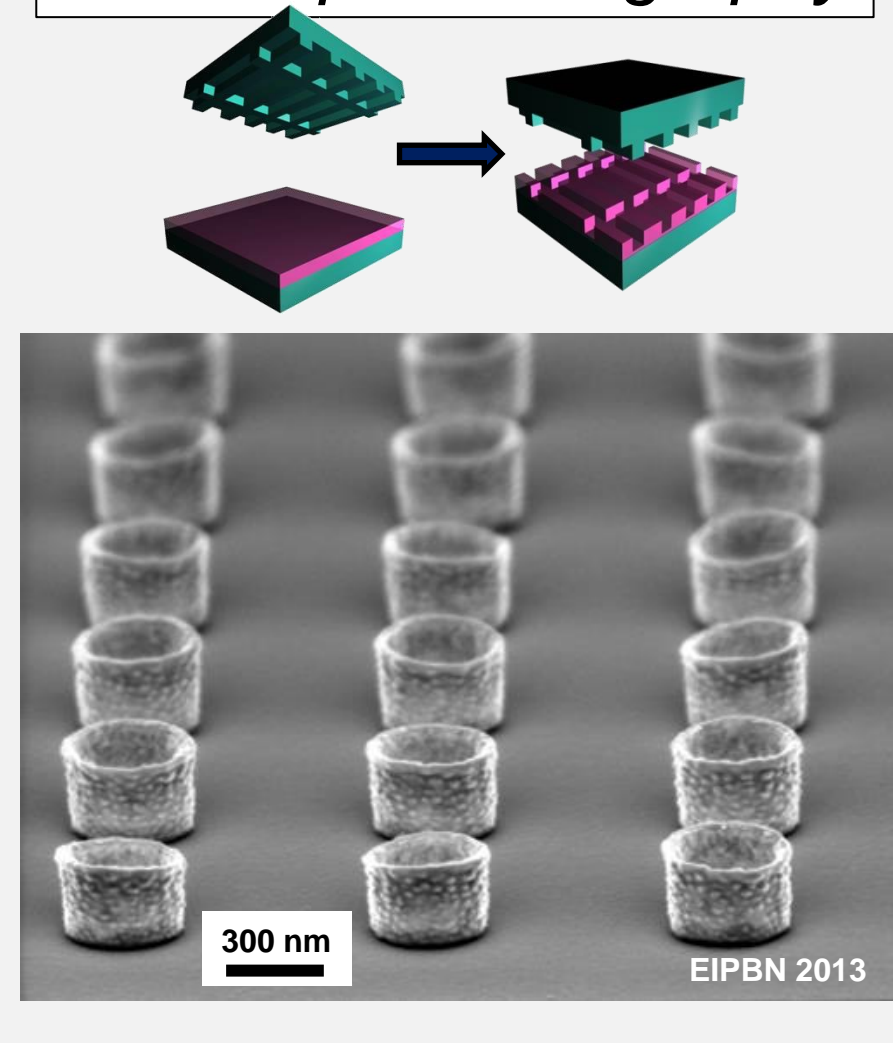
AFM nanolithography



FIB based fabrication



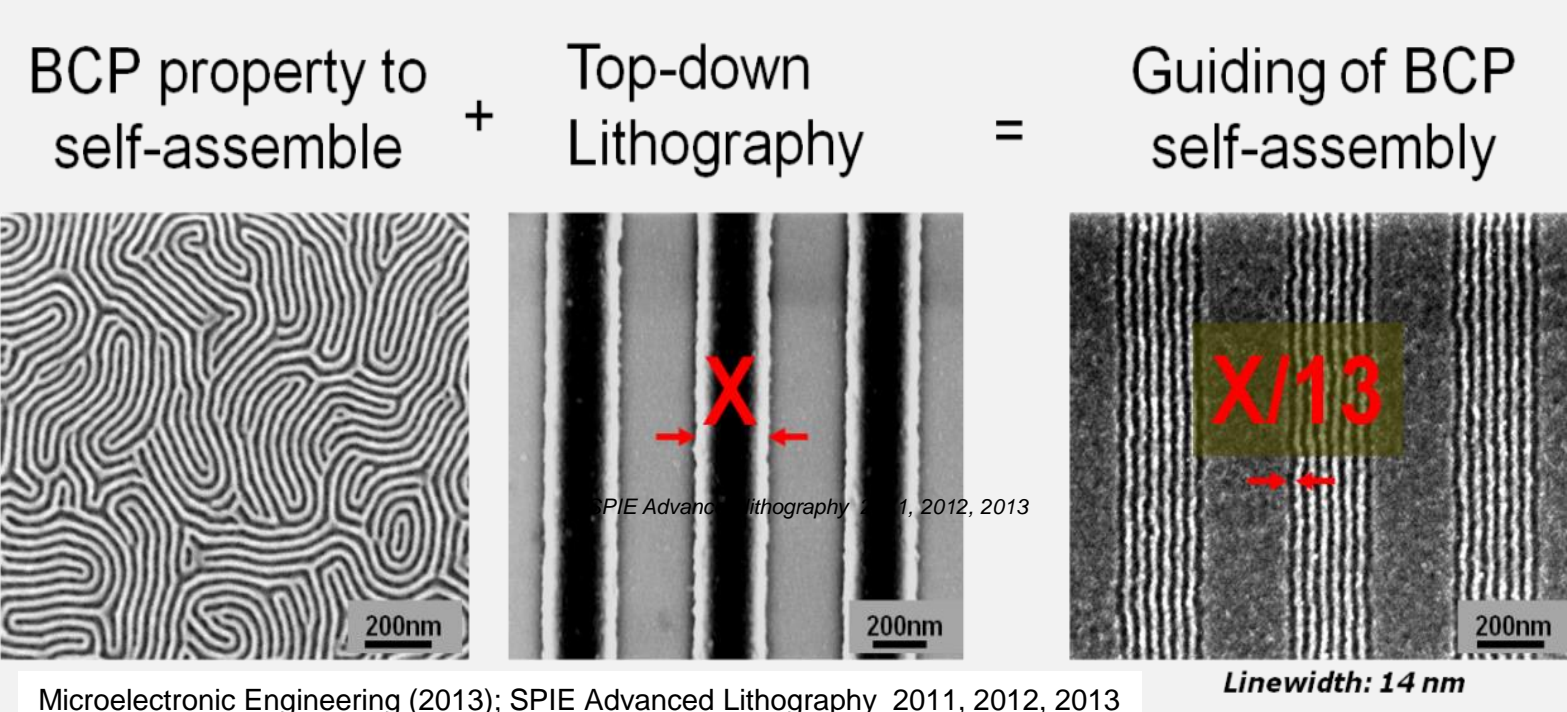
Nanoimprint lithography



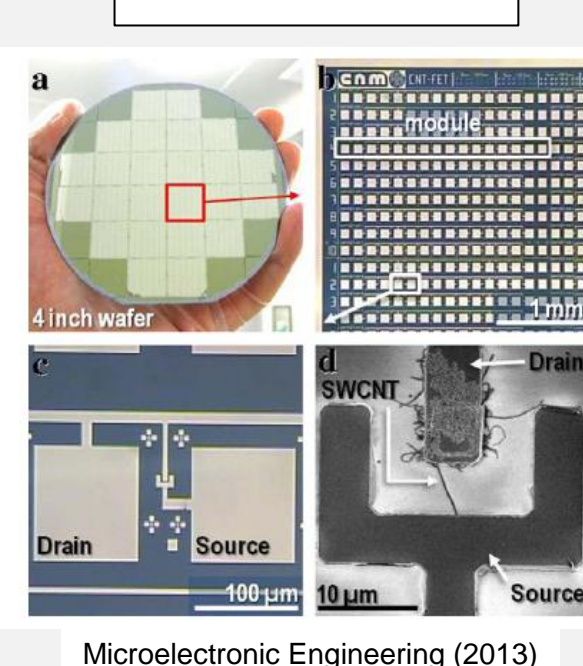
Bottom-up nanofabrication

Bottom-up fabrication is based on using nano-objects as building blocks for fabricating devices and systems, surpassing the limitations of top-down lithography

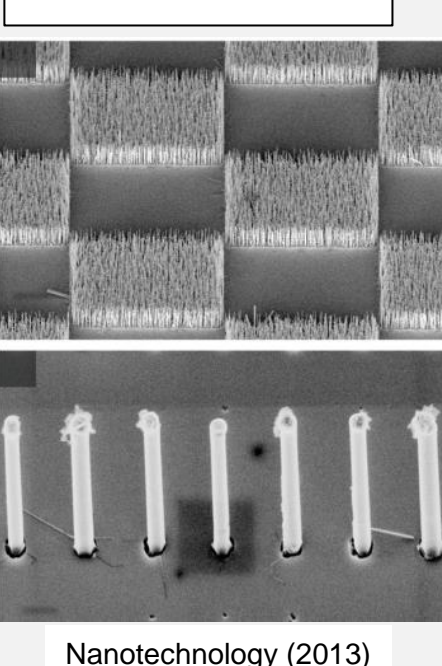
Directed self assembly (DSA)



Carbon nanotubes



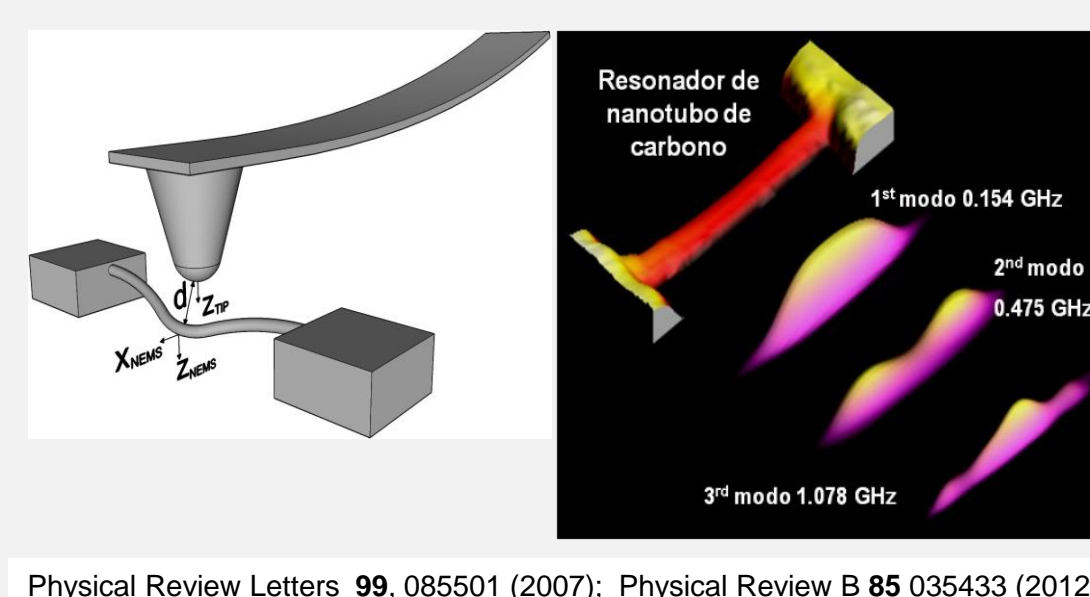
Silicon nanowires



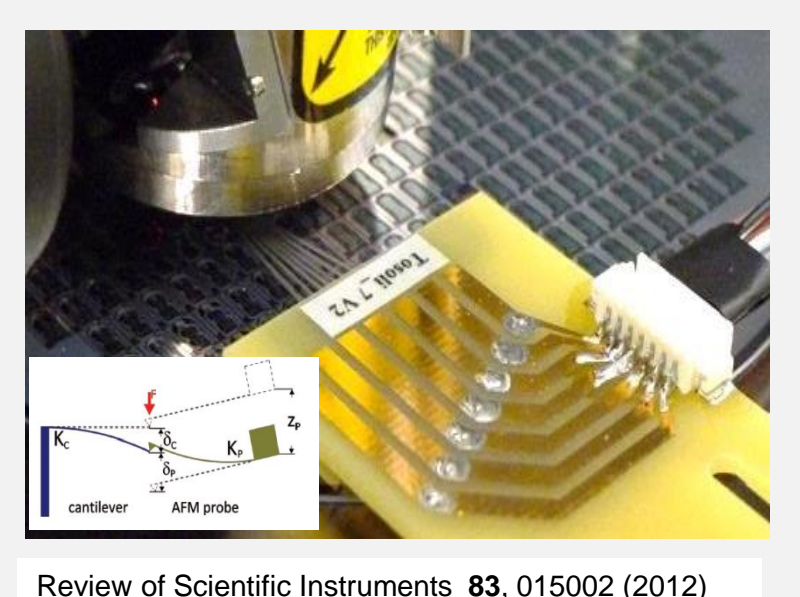
Atomic Force Microscopy

Advanced AFM characterization of nanometer scale devices

Multifrequency AFM to detect the eigen-modes of carbon nanotube mechanical resonators

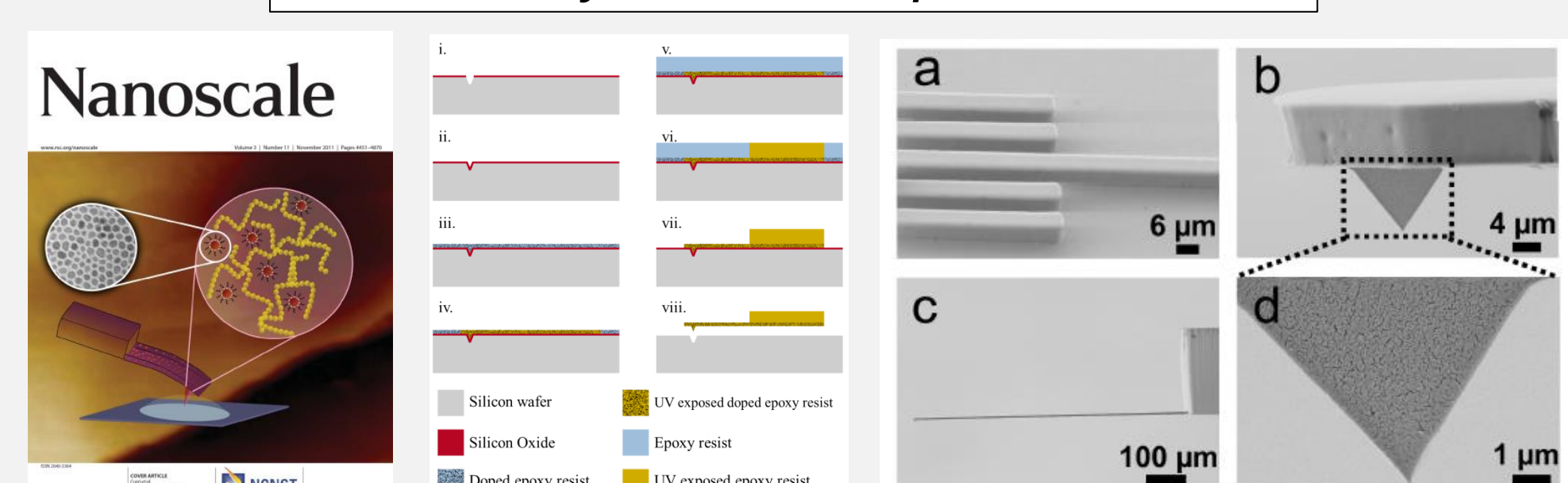


Electromechanical AFM characterization at wafer-scale level



Tecnology for the fabrication of functional AFM probes

Polymeric AFM probes



AFM Cantilevers with (insulated) conducting tips

