SELF-ASSEMBLY OF NANOSTRUCTURED MEMS
ElectroOptics Research Institute & Nanotechnology Center, University of Louisville

SINGLE NANOWIRES INTEGRATED WITH MEMS

- Nanoneedle on MEMS AFM cantilever
- Flexing a polymer nanofiber
- Coated with parylene
- Attached to a live endothelial cell

Easily attached and ruggedly secured onto many MEMS devices and surfaces
Can probe through liquids while keeping the cantilever outside the liquid
Deformation can be seen in an optical microscope

NANOSTRUCTURE TO ENHANCE FUNCTIONALITY

- Nanoporous polymer membrane
- Shape is critical for microfluidics
- Constant diameter stabilizes wetting forces & viscosity and flow velocity easier to interpret
- Tapered carbon structures should provide electric field enhancement for thermionics
- Tapered structures may enable optical end-coupling into gallium nitride into nanofibers

EXAMPLE OF POTENTIAL SYSTEM INTEGRATION

- Flexible nanomaterial coatings for smart missile skins
- Formed from:
  1. painted-on nanomaterials
  2. in-plane interconnects
  3. layer-layer wraparounds

ERINC synthesizes fundamentally new nanowire materials
ERINC manufactures bulk quantities of nanowires – which previously were unavailable
ERINC integrates nanowire materials into systems including:
- Electronics, MEMS, NEMS, nanophotonics
- Polymer composites, dispersions & coatings
- Smart skins & smart textiles

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Customized evaluation samples of these nanostructures available directly from UofL ERINC or through NaugaNeedles, LLC