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## NON-CONFIDENTIAL TECHNOLOGY DISCLOSURE

### High-Resolution Sensor Devices Comprising Nanoscale Materials Having Piezoelectric and/or Pyroelectric Properties

Inventors: Thomas P. Russell, Ph.D. and Jodie L. Lutkenhaus, Ph.D.

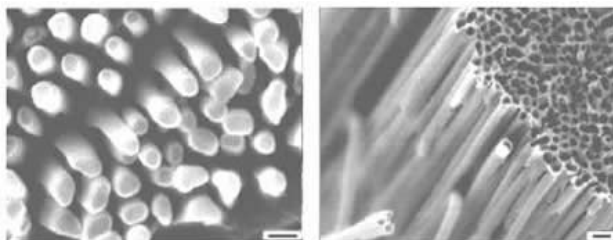
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#### TECHNOLOGY DESCRIPTION

Researchers at the University of Massachusetts Amherst and Yale University have recently developed a novel nanofabrication technology that provides high-resolution (up to  $\sim 10^6$  ppi) mechanical and/or thermal sensor devices comprising individual or two-dimensional arrays of nanorods, nanotubes or nanowires. These nanoscale components are produced using polymers having excellent piezoelectric and/or pyroelectric properties, thus, exhibiting high-sensitivity responses to applied mechanical and/or thermal stimuli. This technology can be applied to a wide variety of two-dimensional sensing applications to enable high-resolution sensing currently unachievable with bulk polymer film based technologies. It can also be used for new electronic and biological applications that require mechanical and/or thermal stimuli-responsive nanoscale components or landscapes.

#### ADVANTAGES

- **High-resolution 2D sensing:** Two-dimensional arrays of nanorods, nanotubes or nanowires integrated with electrode arrays can provide high sensor resolutions up to  $10^6$  pixels per inch.
- **Nanoscale stimuli-responsive devices:** The use of individual nanorods allows for the fabrication of nanoscale devices for easy and direct integration with micro/nano-systems such as MEMS and NEMS.
- **Simple sensor device fabrication process**



#### APPLICATIONS

- Development and fabrication of high-resolution two-dimensional or nanoscale sensors and actuators
- Detection of two-dimensional thermal and/or mechanical signals
- Detection of surface images requiring sub-micron resolution

#### ABOUT THE INVENTORS

Dr. Russell is a Distinguished Professor in the Department of Polymer Science and Engineering at UMass Amherst and a member of the National Academy of Engineering. His research interests span the areas of polymer-based nanoscopic structures and nano-particle assemblies, electrohydrodynamic instabilities in thin polymer films, surface and interfacial properties of polymers, and polymer morphology.



Dr. Lutkenhaus was a postdoctoral researcher in the Russell Lab, and is currently an Assistant Professor in the Department of Chemical Engineering at Yale University. Her research interests include electrochemical energy systems and sensors derived from hybrid composites of hard and soft materials.



**BUSINESS OPPORTUNITIES:** Available for Licensing or Sponsored Research

**DOCKET:** UMA 08-10

**PATENT STATUS:** Patent Pending

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