

# Nanomechanical Systems

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We have created mechanical devices using a variety of materials that we have been studying as sensors and other applications. In most cases, the motion of these devices was detected and in some cases actuated by the application of light. Spatially varying mechanical driving of micromechanical structures was also demonstrated using a scanning probe tip for actuation and an electron beam to detect motion. Sensor applications include immunospecific detection of single bacterial cells and chemical monolayers. Parametric amplification of mechanical motion was demonstrated in a variety of device configurations with optical and electrodynamic drive. High-resolution lithographic processes have been used to create similar resonant mechanical systems with dimensions down to tens of nanometers. Related nanofabrication approaches have also been used to create nanostructures for the mechanical manipulation and sorting of molecules by mechanical and physical properties in a variety of fluid containing system configurations. Mechanical confinement of fluid systems has also been used to enable optical detection and analysis of individual biomolecules.