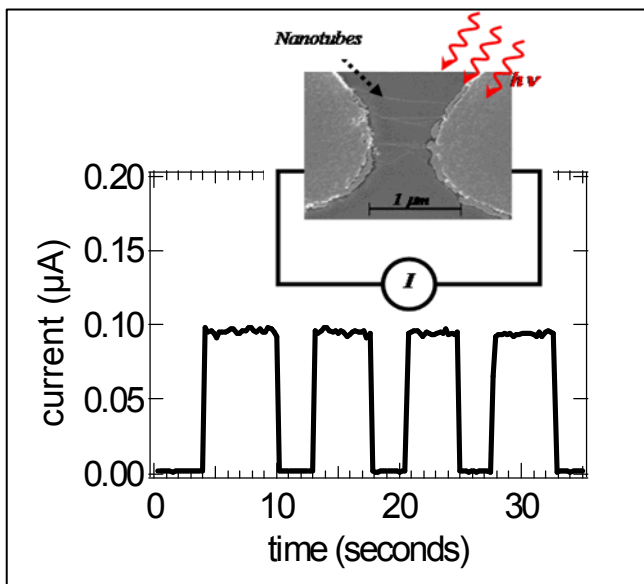


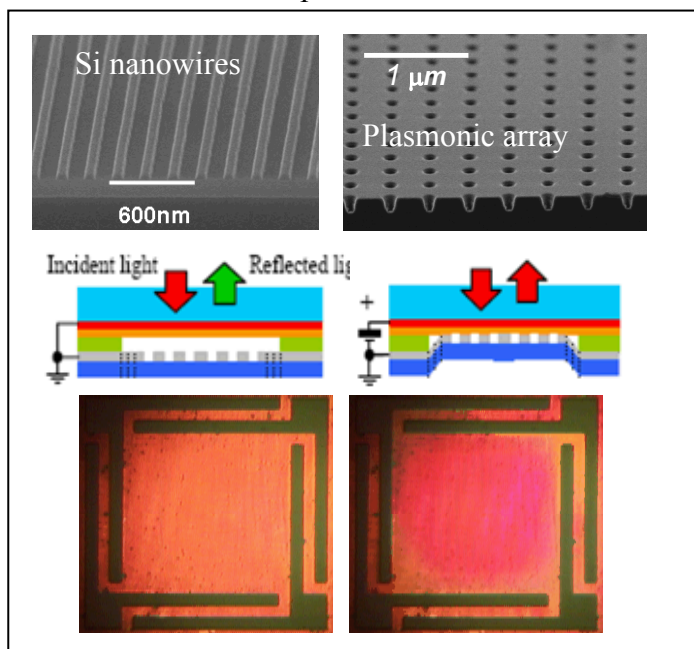
## Carbon Nanotubes Opto-Electronics and Nanoimprint Lithography for Sensors, Transistors and Optical Switches

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**1. Carbon nanotube photodetectors:** The unique electronic structure of semiconducting single wall carbon nanotubes (CNTs) leads to promising properties for light detection over a broad wavelength range, from the ultraviolet to deep infrared regions of the spectrum. We are currently exploring the electronic and optical properties of CNTs as possible replacements for IR detectors based on compound semiconductors, with the potential of covering a broader spectrum, requiring less or no cooling, and lower overall cost.



**2. Large area dense nanowire sensors and plasmonic optical modulators:** Using Nanoimprint lithography, a stamping technique ideal for large volume manufacturing, we have fabricated dense arrays of Si nanowires which can be used for chem. and bio sensing application or for electronic transport in small channels. With the same method, we have also demonstrated plasmonic grating which can be used as optical switches and sensors.



### References:

1. F. Leonard and A. A. Talin, Phys. Rev. Lett. **97**, 026804, 2006.
2. A. A. Talin, L. L. Hunter, B. Rokad, and F. Leonard Appl. Phys. Lett. **89**, 153102 2006; Nature Nanotech. **1**, 160, 2006.
3. J. L. Skinner, A. A. Talin, and D. A. Horsley, Optics Express **16**, 3701, 2008.

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