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Photon sensing with carbon nanotubes: low-temperature photothermal effect on carbon nanotube transistors LIHONG HERMAN, ADAM TSEN, JIWOONG PARK, Cornell University — While thermal effects on the electrical properties of carbon nanotubes (CNTs) are an area of great interest, the effect of single photons on the low temperature conductance of CNTs has not been carefully studied. We recently developed a low-temperature fiber-based laser confocal microscope with simultaneous electrical measurement capability and diffraction-limited laser illumination and detection. In our experiment, CNT devices functionalized with gold nanoparticles were illuminated with a focused laser beam while their conductance was measured at temperatures as low as 300 mK. Photon absorption by either CNTs or gold nanoparticles results in local heating and provides spatially-resolved information about the thermal effects on transport in the CNT as the laser is scanned across the device. Our technique can be easily extended to the study of single-photon effects in other nanostructures including nanowires and graphene in the near future.

LiHong Herman
Cornell University

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