drying process results in a MWNT morphology (entangled bundles 50 nm in diameter) that creates surface roughness. The researchers used scanning force microscopy to characterize the adhesive behavior of the foot-hair mimics and said that the disordered and entangled MWNT bundles provide penetration space for the probe. Higher penetration depths and adhesion forces were observed for this morphology than for MWNTs aligned vertically and densely packed or lying flat on the surface.

The researchers said that any pattern of MWNTs on silicon, which can be controlled by photolithography, can be precisely transferred onto a polymer surface. Furthermore, elastomeric polymers can take the place of the glassy PMMA and provide flexibility on different length scales. In addition, the researchers said that "this approach can provide excellent candidates for dry adhesives for microelectronics and space applications."

STEVEN TROHALAKI

Optical Control of THz Reflectivity of High-Resistivity Semiconductors Achieved

L. Fekete, J.Y. Hlinka, F. Kadlec, and P. Kuzel from the Institute of Physics, Prague, Czech Republic, and P. Mounaix from the Centre de Physique Moléculaire, Optique et Hertzienne, Talence, France, have achieved good modulation of the reflected terahertz wave (reflectivity R = 3–85%) in GaAs by means of optical pumping of the semiconductor. In a report published in the August 1 issue of *Optics Letters* (p. 1992), the researchers said that their finding can be useful in applications such as all-optical devices that allow transfer of information from the optical spectral band to the THz band, opto-THz switches, and modulators. In their ground state, high-resistivity semiconductors are transparent and virtually dispersion-free for THz radiation. However, photoexcited semiconductors exhibit a strong interaction with THz light mediated by free carriers. Fine tuning of the strength of the interaction by the intensity and/or wavelength of optical excitation then leads to interesting phenomena that are directly utilizable for THz light modulation and switching.

The scientists used high-resistivity semiconductor (GaAs and Si) wafers as samples. In their experiments, a Ti:sapphire multipass optical amplifier delivered 1 mJ light pulses with a duration of 55 fs and a mean wavelength of 810 nm at a repetition rate of 1 kHz. One part of the beam (pump) was used for the excitation of the sample surface. Another part of the beam was used for the generation and detection of broadband THz (probe) pulses. The THz pulse, generated at a separate sample, was incident on and transmitted through the GaAs or Si sample under test. The pump pulse was allowed to be incident upon the entrance face of the sample after the THz pulse had entered the sample, but while it was still completely inside the sample. A fraction of the THz pulse was reflected at the exit face of the sample and then propagated back to the entrance face, where a fraction was again reflected back toward the exit face. The transmitted THz signal then consisted of the initial transmitted pulse as well as the echo arising from the reflection at the entrance face. The internal THz reflectance on the photoexcited surface (entrance face) depended dramatically on the excited layer thickness (controlled by the wavelength of the optical pump pulse) and on its conductivity (controlled by the pump pulse intensity). An analytical model was used to explain the experimental result.

VIVEK RANJAN

Extended Low-Temperature Plasma-Assisted Bonding Enhances Wafer Bonding Strength Uniformity

In a plasma-assisted low-temperature Si/Si wafer bonding process, a major concern is how to avoid voids at the bonding interface and improve bonding strength. However, when using

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