



a generous gift
+
academic excellence } → a good reaction.

Presenting the Mork Family Department of Chemical Engineering and Materials Science.



On the eve of the USC Viterbi School of Engineering's

100th anniversary, the merger of our chemical

engineering and materials science departments into one synergistic

unit is momentous indeed. The new technology-focused department is

Viterbi School Research Highlights:

- Ranked third among private schools and seventh overall by U.S. News & World Report's rankings of 2005 graduate engineering programs.
- One of only four engineering schools with two active National Science Foundation-funded Engineering Research Centers: the Integrated Media Systems Center and the Biomimetic MicroElectronic Systems Center.
- Its Information Sciences Institute co-created the Internet's Domain Name System, TCP/IP protocols, co-developed the Globus Grid Computing architecture and conducts research in a broad spectrum of information sciences.
- An SAT average of 1388 for incoming freshmen for the last two years has been leading a dramatic rise in the quality of USC undergraduates.
- Home of the Stevens Institute for Technology Commercialization (SITeC), which combines technology transfer with rigorous academic programs in commercialization issues.
- Home of the Distance Education Network (DEN), the largest engineering e-learning graduate program in the nation with 28 fully accredited M.S. degree programs.
- A robust industry program includes the Center for Interactive Smart Oilfield Technologies, established by Chevron; the Pratt & Whitney Institute for Collaborative Engineering; and the Aerospace Institute for Engineering Research, funded by Airbus.

poised to lead in critical research areas such

as biotechnology, nanotechnology and

energy—including petroleum engineering.

Facilitating the merger is a very generous

naming gift from the Mork Family. John

Mork, a USC petroleum engineering

alumnus, is founder of what is now

known as Energy Corporation of America,

an industry powerhouse in exploration and

production. The Mork Family's exceptional

naming gift will propel the new department's

research into new frontiers, while continuing

to attract outstanding students and faculty.

And will provide the type of synergy that

assures a promising future.

<http://viterbi.usc.edu>

USC Viterbi
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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 $R = 3\text{--}85\%$) 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 multi-pass 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