Detection of Biological Agents: Looking for Bugs in All the Wrong Places
by Laura A. Vanderberg, Analytical Chemistry Sciences, Mailstop E-529, Los Alamos National Laboratory, Los Alamos New Mexico 87545 USA

Correlative Spectroscopic Imaging: XPS and FT-IR Studies of PVC/PMMA Polymer Blends
by K. Artyushkova, B. Wall, J. Koenig, and *J. E. Fulghum, Department of Chemistry, Kent State University, Kent, Ohio 44242 USA

Correlative X-ray photoelectron spectroscopy (XPS) and FT-IR studies of the complex heterogeneous structure of 50/50 PVC/PMMA polymer blends are presented. The comparable lateral resolution and parallel imaging capabilities of both techniques allow for a direct comparison of surface (XPS) and bulk (FT-IR) measurements of polymer blends. To eliminate substrate influence and film-to-film differences, the same areas on the polymer films are analyzed by both methods. The effect of PMMA molecular weight on surface separation and surface segregation is evaluated by using six blends with a constant PVC molecular weight and a PMMA molecular weight varying from 75 kDa to 2,132 kDa. Imaging capabilities of both methods were used for a qualitative comparison of the heterogeneous structure of the blends, while a quantitative comparison of the bulk and surface compositions of the same areas of the samples used small area spectroscopy from XPS and FT-IR. Based on the quantitative analysis, it is concluded that surface segregation of PMMA increases with increasing molecular weight. The determination of both surface and bulk properties of
complex heterogeneous samples is important for a more complete understanding of structure of complex films.

**Raman Microimaging of Polymer Blends**

by R. Appel, *T. W. Zerda, and W. H. Waddell, Department of Physics, Texas Christian University, P.O. Box 289940, Fort Worth, Texas 76129 USA

Raman microimaging was used to estimate the effect of the silica filler on phase separation in binary polymer blends composed of BIMS and BR. The domain sizes, relative concentration of polymer components within domains, and distribution of particulate silica filler and zinc stearate curative were characterized for blends of different compositions and history of aging treatments. The presence of increased concentrations of precipitated silica results in better polymer morphology since domain sizes are reduced. Increased temperature treatment also decreases domain sizes up to about 150 °C, but treatment at 200 °C appears to induce separation of the elastomer components. Silica is usually found near the centers of the BIMS domains. There is little difference in silica distribution before and after curing.

**Surface Enhanced Resonance Raman Scattering (SERRS) and Near-Infrared Fourier Transform Raman Scattering (NIR-FTR) as In Situ Probes of Inkjet Dyes Printed on Paper**

by C. Rodger, G. Dent, J. Watkinson, and *W. E. Smith, Department of Pure and Applied Chemistry, University of Strathclyde, Glasgow G1 1XL United Kingdom

The characterization of ink jet dyes and inks printed onto paper surfaces is of importance for the development of ink jet ink formulations and for use in forensic science. Raman spectroscopy is an effective and informative probe for this purpose if problems associated with fluorescence are overcome. A comparison is made here between two effective techniques, surface-enhanced resonance Raman scattering (SERRS) and near-infrared Fourier transform Raman scattering (NIR-FTR). SERRS provides a good method for obtaining in situ measurements by using a visible laser system. It is fast (1-10 s accumulations) and requires very low laser powers (<1 mW). However, it requires the addition of a small dot of silver colloid to the paper surface in order to produce the enhancement. NIR-FTR is non-invasive and simpler to use. However much higher laser powers are required (>200mW), and the spectra accumulation time is significantly longer. Both methods overcome fluorescence effectively in most samples studied however each is more effective than the other with selected inks and paper substrates. SERRS involves resonant enhancement of the chromophore of the dye in contact with the silver surface and consequently it is the dye chromophore that is uniquely identified. With NIR-FTR, signals from the paper and the filler are also observed. Comparable spectral patterns with clear explicable differences are obtained from each method indicating in particular that SERRS spectra can be interpreted without recourse to specific surface selection rules. The combination of the two techniques provides some information on the electronic as well as the vibrational properties of the dyes in situ.

**Controlled Formation of Isolated Silver Islands for Surface-Enhanced Raman Scattering**

by Raoul M. Stöckle, Volker Deckert, Christian Fokas, and *Renato Zenobi, Department