doi:10.1017/S1431927610062203
Microsc. Microanal. 16 (Suppl 2), 2010

Multi-Technique Surface Analytical Characterization of Dessication-Resistant Supported Lipid Monolayers

Stephen L. Golledge[1] and Raghuveer Parthasarathy[2]

(1) Materials Science Institute and (2) Department of Physics and Materials Science Institute, University of Oregon, Eugene OR 97403

We are probing the utility of various surface analytical methods for the characterization of supported lipid membranes. Such membranes are typically unstable to dehydration, limiting the applicability of many analytical approaches. It has recently been discovered that the lipid trehalose dimycolate (TDM), a natural component of mycobacteria, confers dehydration resistance to supported lipid monolayers. Moreover, TDM and similar synthetic compounds protect monolayers even as minority components of the membrane. The immediate aim of this work is to show that these protected membranes can be probed by analytic tools not normally applicable to lipid systems and to determine how best to exploit the array of analytical methods available in our lab for these characterizations.

Surface analytical techniques can in principle yield a wealth of useful information about the supported lipid systems. Time-of-Flight Secondary Ion Mass Spectrometry (ToF-SIMS) and X-ray Photoelectron Spectroscopy (XPS) yield information on the elemental composition and chemical environment of the outermost few nanometers of the surface. While ToF-SIMS is not a quantitative technique when used in static mode, changes in the chemical makeup at the surface are often nevertheless reflected by changes in the relative intensities of relevant peaks. XPS and ToF-SIMS are being employed in conjunction with Atomic Force Microscopy (AFM) and Scanning Near-Field Microscopy (SNOM) to characterize both the chemical makeup and structural integrity of the set of glycolipid systems under study.