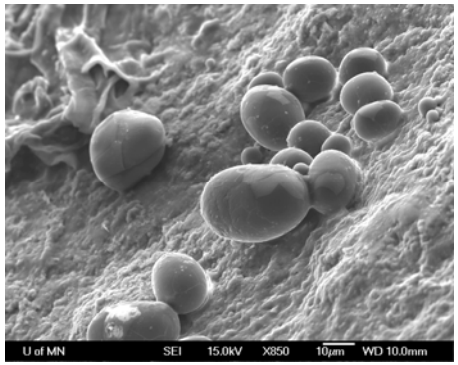
Lithic Residue Analysis: A Comparison of Imaging Techniques

Gilliane Monnier (PI) and Jammi Ladwig

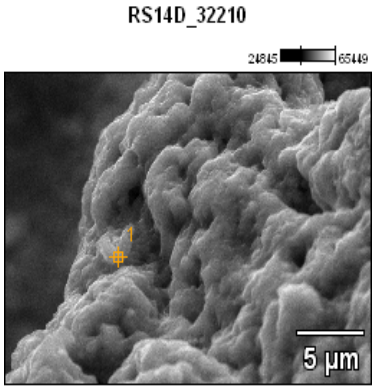
Department of Anthropology, University of Minnesota

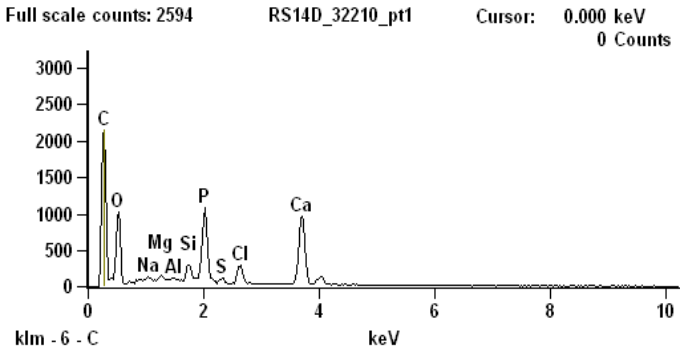
NNIN Facility utilized: Characterization Facility

Abstract: Microscopic analysis of organic residues on stone tools has been used to interpret prehistoric stone tool functions. Light microscopy, however, sometimes lacks the resolution necessary for accurate residue identification. This study is the first to apply both light microscopy and scanning electron microscopy (SEM) to a set of experimental stone tools. Our results show that SEM images provide a level of detail that is not achievable using light microscopy alone. Furthermore, SEM-EDS can provide elemental information useful in residue identification. Finally, Variable-Pressure ("environmental") SEM produces excellent images on uncoated specimens, providing a useful alternative to conventional SEM.



The identification of starch grains in the archaeological record is a useful way to reconstruct subsistence. Our experiments show that SEM is superior to light microscopy for accurate analysis of starch grains.





Sometimes, amorphous residues can best be identified by SEM-EDS, if they contain distinctive elements. Here, the EDS spectrum from a residue from antler-scraping experiments clearly shows the main components of hydroxyapatite, calcium and phosphorus.

Publications:

G. Monnier and J. Ladwig, 2010. Lithic Residue Analysis: A Comparison of Imaging Techniques. Abstracts of the PaleoAnthropology Society 2010 Meetings. *PaleoAnthropology 2010:A22-A23.*