FTIR Analysis: FTIR was performed at both Caltech and MIT on both the thermal closeout shield and actual collector materials. While the collectors showed no evidence of molecular films, the spectra obtained from the aluminum demonstrated some very weak absorptions. Though these were too weak for interpretation, multiple reflections through the surface indicated a thickness on the order of 60 A.

Laser Raman Spectroscopy: The flight sample seen in Figure 2 was examined alongside a control coupon in the spectral range from 250-2000 cm^{-1}. The control showed no features, while the most predominant signal for the flight sample was observed at 1390 cm^{-1}, which could be related to polymerized siloxanes. In addition, there was a partially resolved peak near 1600 cm^{-1}, which may be associated with sp^2-bonded carbon. The silicon flight collectors examined using laser Raman showed no signs of these signatures.

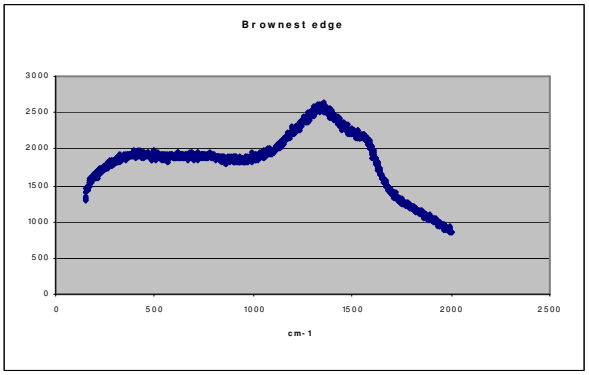

Figure 4. Laser Raman spectrum from flight aluminum thermal shield.

SIMS Analysis: Both positive and negative secondary ion mass analysis were performed on the sample shown in figure 2 at Charles Evans and Associates. The discolored regions as well as the uncolored regions were examined. Comparison of the sputtering rates of the brown or supposedly "thick" areas of the sample to those of nonvolatile organic film residues yielded a maximum thickness of 160 A. Profiles for various species, including O, C, Si, and F are different in the brown and nonbrown areas. The H profiles are similar to the C profiles. Both the brown and nonbrown data are consistent with outer layers more rich in C and H with deeper regions more rich in SiO_2 components. The F profiles are unique and not understood. The depth inhomogeneities in both films could have been derived from a homogeneous contaminant film containing both silicone and fluorocarbon components by a combination of vacuum pyrolysis and UV-induced polymerization, but this interpretation is not unambiguously established. The nonbrown films appear significantly thinner, which may reflect extensive volatilization of these before photopolymerization could take place.

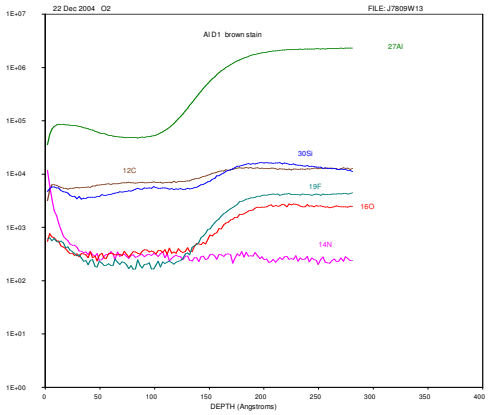

Figure 5. Positive Secondary SIMS results from brown areas of aluminum closeout shield.

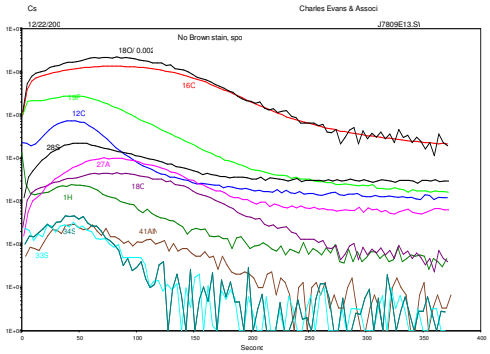

Figure 6. Negative Secondary SIMS results from nonbrown areas of aluminum closeout shield.

Conclusion: Although the brown discoloration on the anodized aluminum appears to be a UV-polymerized hydrocarbon or siloxane contaminant, its apparent thickness is such that it should not prevent detection and measurement of the solar wind in Genesis collectors. The brown discoloration and evidence of molecular contamination has not been detected on any collector materials to date.

References: [1] K.M. McNamara, LPSCXXXVI, this volume.

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