This work was motivated by the need to understand the interaction of the Genesis payload with contamination during the crash in the Utah desert. Silicon contamination has been found to be notoriously difficult to remove from silicon samples despite multiple cleanings with multiple techniques [1]. However, the question has been posed, “Does the silicon really need to be removed for large area analyses? [2].” If the recalcitrant silicon contamination is all pure silicon from fractured collectors, only a very tiny fraction of that bulk material will contain solar wind, which could skew the analyses. This could be complicated if the silicon trapped other materials and/or gases as it impacted the surface.

**Silicon on Silicon Contamination**

a) SEM image of Genesis silicon sample 61881. b) Silicon contamination remaining on Genesis CZ silicon sample 61881 after UPW and IPA cleaning as determined with EDX. c) The sample has been tilted 55 degrees from normal in a Tescan Lyra FIB. A faint electron beam-deposited layer of Pt can be seen across the upper edge of the contamination. This layer was then coated with a 2 micrometer-thick strip of ion beam-deposited Pt.

**Specimen Preparation**

The sample was cleaned at NASA JSC using isopropyl alcohol (IPA) sonicated for 5 min. and ultrapure water (UPW) sonicated for 5 min. according to previously published protocols [3, 4]. A FIB was then used to fabricate and lift out a specimen approximately 15 microns long and 10 microns deep. This section was then thinned to less than about 100 microns in the FIB. The sample was further thinned in a Fischione NanoMill using 900 eV argon at 5 degrees tilt for 10 min. on each side.

**Diffraction and STEM**

Specimen characterization was performed on a TECNAI F20 Super Twin STEM equipped with a Schottky field emission gun, a high angle annular dark field (HAADF) detector, and an EDAX Instruments ultrathin window EDS detector. Convergent beam electron diffraction (CBED) patterns were collected with around a 1 nm electron probe and a 200 mm camera length after moving the probe to an area of interest and tilting the sample to the 001 zone axis. The electron beam energy was 200 keV.

The solar wind implanted surface of the original Genesis collector is approximately 75 nm deep. We also observed a heavily shocked layer of silicon that is partially amorphous and partially polycrystalline with varying crystal orientations as shown by diffraction. A very distinct layer was seen at the interface between the original collector and the silicon contamination. This layer varies gradually in thickness up to 10 nm, thicker than expected for the native SiO\textsubscript{2} on Genesis flight silicon [5]. In some places, this layer seems to disappear completely. An EDS line scan beginning in the shocked polycrystalline silicon and ending at the edge of the solar wind implanted layer shows elevated oxygen in the interfacial layer as well as in the top 5 nm of the collector. Other than a small signal from the copper grid, no other elements were observed. The native SiO\textsubscript{2} layer on the collector may image as brightly as the silicon underneath it because it has been subject to solar wind irradiation damage.

The next step is to fabricate atom probe tomography (APT) specimens from similar contamination on 61881 and further investigate the composition and structure of the interfacial layer at the atomic scale. This layer could conceivably be “brown stain [6],” but no carbon was observed using EDS. If the interface is pure SiO\textsubscript{2}, it is likely that the silicon contamination need not be removed.