INDIGENOUS CARBONACEOUS PHASES EMBEDDED WITHIN SURFACE DEPOSITS ON APOLLO 17 VOLCANIC GLASS BEADS. K.L. Thomas-Keprta[1], S.J. Clemett[1], D.K. Ross[1], L. Le[1], D.S. McKay[2], E.K. Gibson[2], and C. Gonzalez[1]; [1]ESCG at NASA/JSC. Mail Code JE-23, Houston, TX 77058; [2]ARES, NASA/JSC Mail Code KR, Houston TX 77058.

Introduction: The assessment of indigenous organic matter in returned lunar samples was one of the primary scientific goals of the Apollo program. Prior studies of Apollo samples have shown the total amount of organic matter to be in the range of ~50 to 250 ppm [*e.g*., 1-6]. Low concentrations of lunar organics may be a consequence not only of its paucity but also its heterogeneous distribution. Several processes should have contributed to the lunar organic inventory including exogenous carbonaceous accretion from meteoroids and interplanetary dust particles, and endogenous synthesis driven by early planetary volcanism and cosmic and solar radiation.

Results: We report the identification of arguably indigenous carbonaceous matter present on pristine surface coatings of Apollo 17 volcanic black glass beads (74220 sample preparation is described elsewhere [7]). Using UV fluorescence and optical microscopy, we observed three ROIs enriched in C ranging from ~1 x1.5 μm to ~ 3x5 μm in size. C was heterogeneously distributed within the ROI and ranged up to ~10 fold above background. ROIs contained hot spots of Ti, likely rutile, Fe, Mg, Cl and Al. One was covered on an edge by a curved Si-rich filament that appeared to have emanated from the surface containing the ROI. In another case, a Mg-rich grain lies upon the ROI.

Discussion & Conclusions: Based on the chemical heterogeneity, the presence of embedded Ti-rich grains, and the spatial association of the ROI with the overlying Si-rich filamentous feature and the Mg-rich grain, the C-rich regions appear to be indigenous to the sample and not the product of terrestrial contamination. The source of this carbonaceous matter is not constrained. While mostly composed of volcanic pyroclastic droplets, sample 74220 has been slightly reworked by micrometeorites and space weathering. Therefore, the source of the C-rich region could either be from the pyroclastic eruption which formed the glass droplets, or have been added during reworking during its residence in the lunar regolith. Future work will include molecular characterization using a novel 118 nm laser two step mass spectrometer [8] and focused ion beam extraction and mineral and chemical characterization using HRTEM. Additional investigations of the double drive tube 74001 and 74002, which have nearly no lunar surface reworking below a few cm, should reveal whether the C-rich material is indigenous to the original volcanic pyroclastic ash deposits or was added during regolith reworking.

References: [1] Murphy R.C. *et al*. 1970 *Proc. Apollo 11 Lunar Sci. Conf.* **2**, 1891-1900. [2] Preti G. *et al*. 1971 *Proc. 2nd Lunar Sci. Conf.* **2**, 1879-1889. [3] Kvenvolden K. *et al.* 1970 *Proc. Apollo 11 Lunar Sci. Conf.* **2**, 1813-1828. [4] Hodgson G.W. *et al*. 1970 *Science* **167**, 763-75. [5] Ponnemperuma C. *et al*. 1970 *Science* **167**, 760-762. [6] Chang S. *et al*. 1970 *Proc. Apollo 11 Lunar Sci. Conf.* **2**, 1857-1869. [7] Thomas-Keprta K.L. *et al*. 2012 *Lunar Sci. Conf.* **43,** abst. #2561. [8] Clemett S.J. *et al*. 2012 this volume.