

**DEVELOPMENT OF METHODS FOR THE CURATION OF INTERPLANETARY DUST PARTICLES COLLECTED ON POLYURETHANE FOAM SUBSTRATES.** C. J. Snead<sup>1,2</sup>, F. M. McCubbin<sup>3</sup>, M. D. Fries<sup>3</sup>  
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**Introduction:** : The Astromaterials Acquisition and Curation Office at NASA Johnson Space Center is currently developing new tools and methods for the collection, storage, handling and characterization of microscale particles (typically <100µm in diameter). Astromaterials Curation currently maintains four microscale particle collections [2]: Cosmic Dust that has been collected in Earth's stratosphere, Comet 81P/Wild 2 dust returned by NASA's Stardust spacecraft, interstellar dust that was returned by Stardust, and asteroid Itokawa particles that were returned by the JAXA's Hayabusa spacecraft. NASA Curation is currently preparing for the anticipated return of two new astromaterials collections – asteroid Ryugu regolith to be collected by Hayabusa II spacecraft in 2021 (samples will be provided by JAXA as part of an international agreement) [3], and asteroid Bennu regolith to be collected by the OSIRIS-REx spacecraft in 2023 [4]. In order to maximize the scientific yield from these valuable collections, it will be necessary to develop methods that extend our current microscale sample handling capabilities.

We have recently been investigating new methods of collecting interplanetary dust particles (IDPs). IDPs are sub-mm samples of comets and asteroids that are collected in the stratosphere by ER2 and WB-57 aircraft using exposed Lexan collection surfaces coated with a thin layer of viscous silicone oil. Particles collected in this manner exhibit characteristics that are distinct from surface-collected meteoritic material [5]. Although silicone oil collection has been an extremely successful medium for collecting and preserving cosmic dust, it does introduce complications with some elemental abundance and organic analyses. Silicone oil is rinsed from IDPs using hexane; this washing method may remove aliphatic and aromatic organics that are native to the particle. Incomplete rinsing of silicone oil also potentially obscures elemental abundance results that are normalized to Si, which has led to controversies regarding the origin of Glasses Embedded with Metals and Sulfides (GEMS) [6,7]. In 2006, Scott Messenger proposed using open-pore polyurethane foam as a dry collection substrate for IDPs, and the first foam collector (W7262) was flown in October 2006 for eight hours [8]. Extraterrestrial dust was identified and recovered from the collector,

and the results were reported. The routine collection and distribution of IDPs using dry collection techniques is a major objective of Microscale Astromaterials Advanced Curation; here we describe initial progress towards the development of documentation and extraction methods for the curation of dry-collected interplanetary dust particles.

#### **Polyurethane Foam Extraction Experiments:**

Recently, we have been investigating methods to locate and extract interplanetary dust particles from foam cells with minimal risk of loss or fragmentation. The identification of particles on a translucent, three-dimensional collection surface with complex topology presents a significant challenge, as does the removal of particles from such a surface. Since particles adhere to the foam via Van der Waals forces, risk of sample loss during extraction due to triboelectric charging is greater than for IDPs collected in oil. In order to test identification and extraction methods, we fabricated an analog foam collector by adhering a 1/8" thick sheet of white polyurethane foam to a surplus Lexan IDP flag using double-stick tape; excess foam was trimmed to match the profile of the flag. Small (<20µm) particles of Bells CM2 meteorite were transferred from a concavity slide into individual foam cells using a MicroSupport AxisPro micromanipulation system and bent glass needles. Po-210 sources were utilized to minimize triboelectric charging effects. Ten particles were implanted into our experimental foam collector apparatus using this technique. We then reversed the transfer process to remove four of the particles from the collector onto cleaned glass slides. None of the particles were lost due to vibration or triboelectric charging effects.

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