Micrometeoroid from MISSE Examined to Understand the Effects of the Space Environment on Space Suit Materials

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Abstract

Samples that were part of the Materials International Space Station Experiment (MISSE) experienced varying effects whilst exposed to the space environment; perhaps the most intriguing effect was the crater created by a micrometeoroid impact into a thin film of Vapor Deposited Aluminum (VDA) coated Mylar. Approximately 180 samples of various materials used in space-component design were flown on MISSE-6 and spent 18 months suspended off the side of the International Space Station. The Utah State University SUSpECS project was a unique student experiment that allowed for pre- and post-flight analysis of these material samples which were returned in pristine condition after exposure to the space environment. Despite micrometeoroids being a common occurrence, there is a significant lack of data pertaining to the effects of micrometeoroids on space components. Further examination of the micrometeoroid impact sample will allow us to determine the impact velocity, mass, and composition of the micrometeoroid and its influence on materials in space. Micrometeoroids pose a serious threat to space operations and in turn require constant observation. It is of particular interest to note that Mylar is a major component in the construction of astronaut suits; the knowledge gained from our evaluation this meteoroid will allow us to determine the mass required to penetrate through a spacesuit.