SpaceX CRS-7 Re-flight of SSEP Mission 6 Experiment Lost in Orbital Sciences 3 Explosion, October 28, 2014

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The following experiment was 1 of 18 SSEP Mission 6 experiments lost with the Orb-3 explosion on October 28, 2014. This is the only Mission 6 experiment not yet re-flown. All other Mission 6 experiments were re-flown on SpaceX CRS-5 on January 10, 2015.

North Charleston, South Carolina

How Does Spaceflight Affect the Formation of Tin Whiskers on Lead-free Solder?

Grades 9 and 11
Palmetto Scholars Academy, South Carolina Public Charter School District

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Proposal Summary: Tin whiskers – the crystalline structures that originate from metals covered in or plated with tin – have become a serious problem for electronics manufacturers and scientists. These tin whiskers can short-circuit devices by creating a new electrical current. In fact, tin whiskers have even been known to destroy planes and satellites, resulting in not only considerable risk of human life but in the loss of hundreds of millions of dollars. Tin whiskers have caused the destruction of the Galaxy IV, Galaxy IIIR, and Solidaridad 1 satellites, and more.

Our group is interested in testing the entire experience of spaceflight on the development of tin whiskers, including the launch and re-entry. We believe that the g-force experienced in the journey to and from the ISS and microgravity experienced on the ISS will promote the growth of tin whiskers on the tin-plated testbed and the printed circuit board. We will also utilize a procedure created by Dr. Lyudmyla Panashchenko, a NASA scientist in the Electronic Growth and Packaging program, to maximize the possibility of tin whisker growth on the testbed.

To test our hypothesis, our team would send a lead-free solder testbed to the International Space Station to compare the development of tin whiskers with the control testbed that would remain on Earth. We will analyze the mass of the sample, length, structure, and density of the whiskers. The results of our experiment would increase our current understanding of the effects of spaceflight and microgravity on the stability of electronic devices sent to space.