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"NASA’s Contamination Control of Space Exploration
Flight Hardware in Thermal Vacuum Chambers and ISO Cleanrooms"

ABSTRACT:
NASA’s Missions includes the use of complex engineering system which are required to operate years (sometimes decades) without any maintenance or human intervention. This requires that these integrated systems have strict contamination control standards. Of particular interest to contamination control is material outgassing of the integrated system which can cause serious damage to sensitive instrumentation and ruin multi-million dollar mission. Contamination Control is mitigated by several methods which includes, but is not limited by, cleanroom cleanliness during processing and integration, and thermal vacuum testing. Flight Hardware is kept in our ISO 5 – Class 100 cleanroom and monitored via several techniques including NVR plates, particle fall out plates, and particle counters (in accordance to ISO 14644). Secondly, the flight hardware is tested and validated in our 8ft x 15 ft thermal vacuum chamber which is instrumented with 64 t-type thermocouple, RGA, two CQCM, a scavenger plate, and a cold finger. All materials are carefully selected and tested for outgassing characterizations both as a component and again as an integrated system. Using these techniques, we can ensure that the flight hardware is safe from contaminants (both particulate and molecular) and can operate in tough environment of space for years and decades while providing valuable scientific data.

BIO:
Ms. Denisse Aranda is a M.S. student at Virginia Tech in the Materials Science and Engineering department. She completed her B.S. degree in May 2010 in Mechanical Engineering and researched high temperature aerogels for hypersonic applications. She is currently at NASA Langley Research Center co-op in Hampton, Virginia as a Contamination Control Engineer for the Systems Integration and Test Branch. Denisse’s research interests include development of analytical tools to verify flight hardware to meet contamination control standards under the direction of Dr. Michael Kelley.