

MATERIALS AND STRUCTURES SYMPOSIUM (C2)  
Space Environmental Effects and Spacecraft Protection (6)

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CUBESAT IN-SITU DEGRADATION DETECTOR (CIDD)

**Abstract**

The design of the thermal control and management system (TCS) is a central task in satellite design. In order to evaluate and scale the properties of the TCS, the conductive and radiative properties of the different components have to be known, including their respective variations within the mission lifetime. In particular the change of the thermo-optical properties of the outer surfaces including critical TCS components such as radiators and thermal insulation are subject to degradation caused by an interaction with the space environment. The evaluation of these material parameters by means of laboratory tests is a time-consuming and expensive endeavour. Long-term in-situ measurements on board the ISS or large satellites realizes a better implementation of the environmental effects but can also only be realized at considerably high costs and are subject to availability. Motivated by this we propose the utilization of flexible low-cost nano satellite systems to realize material tests within space at a considerably reduced cost. We present a nanosat-scale degradation sensor concept which realizes low power consumption and data rates compatible to nanosatellite restrictions. By means of a predefined measurement and messaging cycle temperature curves are measured and evaluated on ground to extract the change of absorptivity and emissivity of material specimen over mission lifetime. The concept and the roadmap for a nanosatellite mission to test the hardware will be discussed.