

IAF MATERIALS AND STRUCTURES SYMPOSIUM (C2)  
Interactive Presentations - IAF MATERIALS AND STRUCTURES SYMPOSIUM (IP)

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NOVEL DESIGN, TEST AND INTEGRATION OF THERMAL CONTROL ELEMENTS IN SMALL  
SATELLITES: THE KIBO CUBE ROUND 5 EXPERIENCE.

**Abstract**

Due to a high value in terms of low-cost access to space and science return and commercial revenue offered by the CubeSat platform, its popularity has increased. With this increased recognition, so has escalated the complexity of the payloads being implemented; with applications ranging from earth science to space weather, astrophysics and even as an in-situ space laboratory as noted in a study by Skolkovo Institute of Science and Technology (Poghosyan Golkar, 2017).

In this context, novel more efficient passive thermal isolation technologies for nano satellites, are the key enablers for future more complex scientific outcomes and innovative business models. Furthermore green and more sustainable technologies and processes are increasingly on demand in the space sector as demonstrated by the interest in projects like the one from Kyoto University using organic materials for cubesat mechanical design (Harper, 2020) The MRZ-SAT cubesat project was selected by the United Nations Office for Outer Space Affairs (UNOOSA) and Japanese Space Exploration Agency (JAXA) as the winner of the 5th round of KIBO cube to receive full funding for its deployment into orbit. This provides a solid and unique opportunity for researchers in the Central American region to propose and test novel solutions and endogenous technology development for challenges such as more sustainable and efficient thermal isolation for cubests. The purpose of this investigation is to compare different kinds of thermal coatings and a multilayer isolator made with non-common natural materials available in the Central American region. Different materials will be first tested by simulation carried out with Thermal Software. An engineering model made with the proposed novel materials will be subsequently tested alongside the flight model as part of the cubesats flight readiness test to be performed at Kyushu Institute of Technology in Japan. Once the flight model is in orbit the thermal data will be used to extrapolate the results from the tests in order to predict the material flight worthiness for future technology demonstration missions.