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WOLFSAT-2: ASSESSMENT OF WOOD FOR CUBESAT APPLICATIONS

Abstract

Recent interest in sustainable materials for small satellite platforms has led to the development of wood-based CubeSats. In November 2024 the wooden satellite LignoSat-1, developed by Kyoto University and Sumitomo Forestry, was launched aboard a SpaceX Falcon 9 rocket to the International Space Station and subsequently deployed into low Earth orbit. Constructed from magnolia wood panels, the satellite survived 116 days in orbit. However, a communication failure prevented the retrieval of key telemetry data, including strain, radiation exposure, and internal temperature measurements. WolfSat-2, another wood-based CubeSat being built by the middle and high school students of the Wolfpack CubeSat Development Team, This novel CubeSat is scheduled for launch in February 2027, with mission coordination provided by the launch provider Interstellar Technologies Inc, a Japanese aerospace company. The project has two primary objectives: (1) to further assess the viability of wood as a structural material for CubeSat applications, and (2) to develop scalable educational models that introduce high school students to space engineering and satellite design. The development process of WolfSat-2, including wood material selection, structural shell design, and sensor integration will be presented. Instrumentation is designed to monitor the mechanical integrity of the wooden structure, internal temperature, radiation environment, and local geomagnetic field during flight. By addressing material performance and educational impact simultaneously, this work aims to contribute both technical insight and outreach value to the growing field of sustainable small satellite development.