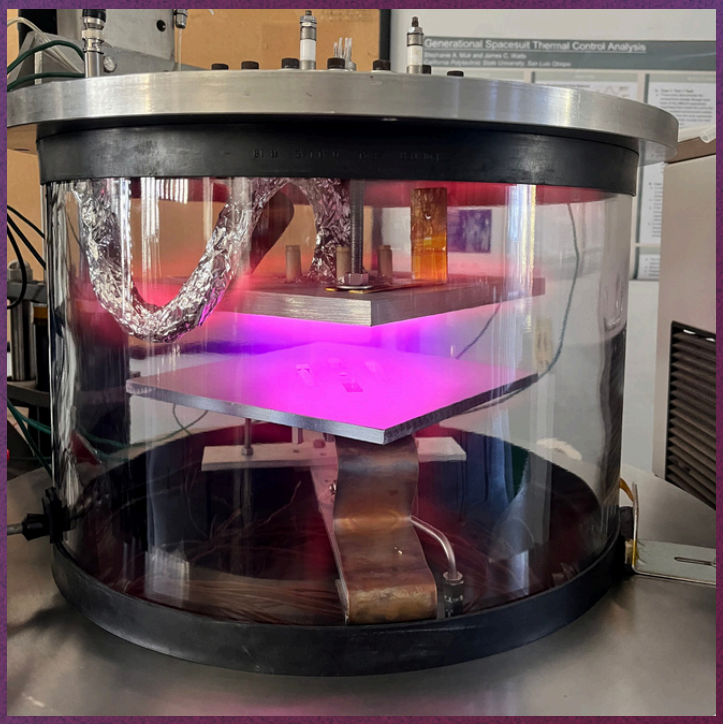
EFFECTS OF ATOMIC OXYGEN EXPOSURE ON STRESSED DRAG SAIL MATERIALS FOR LOW EARTH ORBIT APPLICATIONS

Nazanin Sadeghian-Dezaki



As low Earth orbit grows increasingly congested, FCC regulations require satellites to deorbit within five years, making drag sails a practical compliance solution. A key design concern is how atomic oxygen (AO), abundant in LEO, affects sail materials under mechanical stress. Using Cal Poly's MAX AO chamber, a full factorial experiment tested single-sided aluminized Mylar® across multiple stress levels and exposure durations, with percent area exposed as the response variable. Statistical analysis revealed that stress has a significant effect on AO degradation; however, material loss remained minimal across all conditions. When applied to a NanoSail-D2-based deorbit simulation, differences in deorbit time across all test cases were minimal.

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