

IAF SPACE SYSTEMS SYMPOSIUM (D1)
Innovative and Visionary Space Systems (1)

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DESIGN AND TESTING OF SELF-DEPLOYABLE STRUCTURES FOR ADVANCED SPACE
APPLICATIONS**Abstract**

In the recent years a huge interest raised on Shape Memory applications, especially those using shape memory polymers (SMPs) and composites (SMCs). This because of their intrinsic benefits and potential for growing performances. In particular, space applications could profit of their capabilities to reduce volumes and weight, and even enable specific missions not possible with current technology. The aim of this paper is to identify such applications and propose design solutions for self-deployable structures to be applied on satellites and spacecraft. Selected technologies for such solutions have been manufactured and small-scale tested to reproduce self-deployable architectures for specific applications, like solar sails, de-orbiting systems, debris removal and solar arrays concepts. Main results show that SMCs can be folded and deployed to follow the required architectures without relevant damages and maintaining good structural properties able to comply with mission constraints. Original results have been achieved in terms of feasibility and shall be here presented and discussed, including a preliminary design of sail drag augmentation concept to de-orbit both small and medium satellites. Finally, a roadmap to new developments will be shown, as well as possible innovations to enhance these novel applications to the space domain.