

MATERIALS AND STRUCTURES SYMPOSIUM (C2)
Specialized Technologies, including Nanotechnology (8)

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USE OF A POLYMERIC SURFACE FOR DEPLOYMENT SYSTEMS TIMING

Abstract

Students, researchers and professors of GAUSS (Group of Astrodynamics of University "Sapienza") at School of Aerospace Engineering of Rome are involved since 1990 in space programs with the aim to design, manufacture, launch and operate in orbit small educational satellites. This paper deals with an innovative solution for deployment system timing. The solution is based on the degradation of the polymeric surface due to the interaction with atomic oxygen and orbital radiation. In the first part the preliminary experiments about the degradation of materials are exposed. Many kinds of polimer are exposed to a source of atomic oxigen that represent the LEO atmospheric composition to choose the material that have faster and more homogeneous degradation. The second part describes the test of the material selected using the Unicubesat platform in real orbit conditions through the measurement of the optical parameters. The last part analyses the measured data obtaining the standard time of degradation for LEO orbit between 350 and 800 km. This data is aimed to develop a specific subsystem, i.e. a deorbiting one, that can take advantage from this completely passive solution. In this way no power is needed and the decay is also guaranteed when an accidental failure occurs turning off the satellite before the estimated EOL. A totally passive drag-based subsystem is the smartest and simplest solution with also high reliability. The deployment system proposed will be validated on the next Unisat developed and built by GAUSS team.