

MATERIALS AND STRUCTURES SYMPOSIUM (C2)
Space Vehicles – Mechanical/Thermal/Fluidic Systems (7)

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NANOSTRUCTURED RIGID FOAMS FOR SPACE APPLICATIONS

Abstract

TOSEDA s.r.o. has developed a special type of nanofilled polymeric material designed to be applicable as an adhesive for bonding thermo-insulation foams and aluminum alloys used in space industry. The technical requirements set by the European Space Agency contained the following technological criteria. The material has to be applicable by injection, shall be curable at temperature up to maximum 50 C, shall exhibit good adhesion to Airex R 82 foam as well as aluminum alloys, and in cured state shall have density of about 0.25 g/ccm and tensile strength of about 2.5 MPa. The low density polymeric materials for high-tech applications are usually based on structural foams containing hollow particles. Disadvantage of their use is relatively high viscosity, flowing during storage, and sensitivity to mechanical degradation. Another drawback of the conventional systems is usually loss of adhesion to substrate after thermal cycling. TOSEDA solved this problem by formulating a two component epoxy system modified by tailor designed nanostructures and containing a chemical blowing agent releasing non-toxic gas after its activation. The demonstration activity confirmed that the ambitious technological requirements were fully accomplished.