

TPF-for-TOA Transparent Polyimide Films for Thermo-optical Applications AO/1-9576/19/NL/KML

An ESA supported project together with beyond gravity (AT) and TOSEDA s.r.o. (CZ) with AAC (AT) as the project leader.

ABSTRACT

In the recent years, the application of titanium alloys in aerospace has increased significantly, especially TOSEDA s.r.o. (CZ) an SME providing contract research and development in the field of polymer chemistry and nanotechnologies and Aerospace & Advanced Composites GmbH (AT) as a service provider in the field of application-oriented research and technology development successfully worked on an ESA preliminary study aimed at developing a novel type of polyimide foils applicable in a second surface mirror configuration. The novel polyimides were tailor designed to provide excellent thermo-optical performance during their operation at low Earth orbit (LEO) environment conditions. These new materials reached the desired properties as low outgassing, low solar absorptance and high thermal emittance, resistance to thermal cycling and withstand VUV/UV, electron and proton irradiation.

Therefore, the materials in course of the previous activity shall be further developed to optimise their radiation resistance and together with beyond gravity (AT), a leading European supplier and integrator of systems and components for international space missions, to demonstrate the scale-up of the materials production process for space relevant MLI and OSR configurations.

The main technical objectives of the ITT are summarised as follows:

- Follow-up and consolidation of previously developed hybrid transparent polyimide films;
- Fully optimisation of these selected materials;
- Optimisation and refinement of chemical compositions to obtain the required surface resistivity, film thickness and good radiation resistance for long term space applications;
- Manufacturing and characterisation of breadboard demonstrators in form of MLI and ASR configurations;
- Large scale manufacturing capability on breadboard scale, incl. the metallisation process;
- Direct comparison to commercial space qualified reference systems is required;
- The requirements listed in Chapter 6 of the SoW shall be fulfilled;
- The developed systems shall be ready for use in space-related applications;
- Achieve TRL 5.

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