

**Title:****Polymers self-healing in space environment**

Laboratoire de Chimie des Polymères Organiques ([www.lcpo.fr](http://www.lcpo.fr)), Bordeaux, France, in the team « Polymerization Catalysis and Engineering »

Work in collaboration with CNES and ONERA

**Project:**

The geostationary environment around the Earth presents harsh conditions which strongly influence the spacecraft performances and lifetime. Polydimethylsiloxane (PDMS) resins play a key role in the conception of thermal control coatings or transparent tapes (bonding windows for solar cells or OSR, transparent adhesive). In flight, over time, resins exhibit an alteration of their properties as shown by a loss of flexibility, transparency and a degradation of the surface state. In particular, yellowing and cracking are observed due to the presence of energetic photons and charged particles (protons and electrons). As an evidence, limiting the degradation of polymeric materials and their cracking during space missions is an important stake for many studies.

Two recent thesis works (CNES-ONERA financial support in collaboration with the LCPO, Bordeaux University, and MAP coating) were dedicated to the knowledge of the degradation mechanisms and the stabilization of these PDMS resins to the spatial environment (UV and protons specifically). Moreover, the first innovative solutions for the stabilization under UV radiation and proton exposition were developed and validated.

The objectives of this new study are to continue the hopeful work performed during the latest thesis works, with especially the creation of hybrids class II materials and self-healing solutions. A significant work in polymers synthesis will be planned. Formulated materials will then be analyzed to estimate the stabilization gain obtained with these new solutions.

**Required Skills:**

Applicants should hold a Master degree (or equivalent) in Polymer Science with a solid expertise in polymer synthesis and structural characterization techniques. Team capability and good skills in English are required.

**Contact:**

Applications will comprise the names of two references, a CV with a motivation letter.

Project starting in October 2020 ; Duration: 36 months

Deadline submission: 27/03/2020

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