Training Opportunity for Portuguese Trainees

Reference	Specialist Area	Duty Station
PT-2010-TEC-QEM(4)	**Self healing atomic oxygen resistant materials by modification of the nano-structure**	**ESTEC**

Overview of the Division missions:

The Materials and Components Space Evaluation Division in the Product Assurance and Safety Department of the ESA Directorate of Technical and Quality Management is responsible for the evaluation and qualification of non-metallic materials, processes and Electronic, Electrical and Electromechanical components for space flight applications. This includes the direct technical support of ESA projects and technology programmes for all related product assurance tasks and includes standardization, research and development activities to determine the suitability and reliability of materials and components to withstand the influences of the space environment.

Overview of the field of activity proposed:

Most of ESA's Earth Observation missions operate in the LEO environment where atomic oxygen (ATOX) constitutes the dominating constituent of the space environment. The impingement of ATOX on external surfaces leads to erosion, changes in thermo-optical and reflective properties and may also increase the risk of ESD in orbit.

The purpose of the study is to develop, verify and manufacture intrinsically self healing polymers that can be used as an external layer in an ATOX dominated LEO environment. Several different concepts have been tried in the past to achieve that but only an intrinsically ATOX resistant material is expected to achieve the desired functionality. Protective coatings that have been tried in the past are not fault/failure tolerant and tend to debond or are attacked due to undercutting. The study aims to specifically modify materials by intrinsically incorporating ATOX resistant components (oxides or oxide forming constituents) in the molecular structure of the base polymer. With that approach undesired effects such as debondings and undercutting of coatings will be avoided because a self healing ovide layer will be formed that will protect the underlying polymer.

Expected contributions of trainee

Integrate within team at ESTEC carrying out ATOX space simulation
Perform extensive test programme
Perform relevant materials analysis & interpret results
Report results and prepare scientific publications

Required Education:

Basic understanding of space environment
Graduate of Materials Science/Materials Physics & Chemistry, hands-on work
Experience in a lab environmental is beneficial.
Good understanding of materials analysis techniques