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Elastomeric Nanocomposites for Space Applications

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Abstract : Elastomeric composites have been known for a long time, but, to our knowledge, space and the aeronautic community has been directing a special attention to them only in the last decade. The required properties of advanced elastomeric materials used in space applications (such as O-rings) are sealing, abrasion, low-temperature flexibility, the long-term compression set properties, impact resistance and low-temperature thermal stability in different environments, such as ionized radiations. Basically, the elastomeric nanocomposites are composed of a rubber matrix and a wide and varied range of nanofillers, added with the aim of improving the physico-mechanical and elasticity modulus properties of the materials as well as their stability in different environments. The paper presents a partial synthesis of the research regarding the use of silicon carbide in nanometric form and/or organophylized montmorillonite as fillers in butyl rubber matrix. The need of composite materials arose from the fact that stand-alone polymers are ineffective in providing all the superior properties required by different applications. These drawbacks can be diminished or even eliminated by incorporating a new range of additives into the organic matrix, fillers that have important roles in modifying properties of various polymers. A composite material can provide superior and unique mechanical and physical properties because it combines the most desirable properties of its constituents while suppressing their least desirable properties. The commercial importance of polymers and the continuous increase of their use results in the continuous demand for improvement in their properties to meet the necessary conditions. To study the performance of the elastomeric nanocomposites were mechanically tested, it will be tested the qualities of tensile at low temperatures and RT and the behavior at the compression at cryogenic to room temperatures and under different environments. The morphology of specimens will be investigated by optical and scanning electronic microscopy.

Keywords : elastomeric nanocomposites, O-rings, space applications, mechanical properties
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