

Mechanical properties of food packaging polymer materials after their exposure in artificial solar radiation

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The use of polymer materials in food packaging is widely known over the last years. Food packaging materials is possible to expose to irradiation in many different stages, besides the exposure in irradiation during the food preservation, such as their exposure to solar radiation before the consumption of the food and during the transportation and the storage, as well. The aim of this study was to examine four commercially multilayered packaging materials after their exposure in an accelerated radiation conditions in a weatherometer. Tensile and nanoindentation tests were performed to evaluate their mechanical performance. Mathematical models containing parameters with physical meaning (maximum stress, maximum strain, elasticity and viscoelasticity parameter) were fitted to tensile curves. The nanomechanical properties and deformation mechanism (elastic/plastic deformation response) of the examined materials were also compared and discussed. The results showed that the examined polymers presented significant variation on their mechanical properties due to artificial aging, not only the bulk of the polymers but also their surface. In specific, Hardness and Elastic modulus values, presented greater changes in the surface of polymers than in the bulk of the materials in most of the examined materials.

Keywords: degradation, nanoindentation tests, packaging materials, polymers, radiation, tensile tests.