"MICROWAVE HEATING OF POLYMERS: INFLUENCE OF CARBON NANOSTRUCTURES DISPERSION ON THE MICROWAVE SUSCEPTOR EFFECTIVENESS"

Begoña Galindo[1], Adolfo Benedito[1], Fernando Ramos[2], Enrique Gimenez[2]

[1]AIMPLAS Technological Institute of Polymers, Valencia, Spain

[2] Instituto de Tecnología de Materiales, Universidad Politécnica de Valencia, 46022 Valencia, Spain

Microwave technology provides an alternative methodology to conventional heating of polymers. Two major effects are responsible for the heating which results from this interaction: dipolar polarization and conduction. The microwaves do not interact with the majority of polymeric materials due the lack of dipolar moment. For this reason, additives as heating susceptors can be used to prepare materials able to absorb microwaves. These additives are conductive, or have dielectric properties significantly different from the polymeric matrix. The electric field will modify the polymer environment and heating profiles will be different from the base polymer. Depending on the nature of the susceptor the material response to the microwaves can be due to one specific mechanism or combination of several of them.

The effectiveness of microwave susceptors depends on the particle size, shape, concentration, electrical resistivity and the distribution and dispersion within the polymeric matrix. The most widely used and effective susceptors are carbon structures. Other suitable particles as silicium carbide, titanium dioxide, metal flakes, zinc oxide or talc have been tried.

In this work it has been studied the effect of **carbon nanostructures as microwave susceptors dispersed in a polymeric matrix**. Polypropylene was chosen as matrix due its non-polar nature and microwave transparency. Thermoplastic composites were prepared by melt mixing procedure using a co-rotative twin screw extruder. The effectiveness of heating process was tested taking into account critical parameters as susceptor concentration, microwave source and **dispersion quality**. In this way, it is possible to develop products, based on low energy cost thermoforming processes, selective welding surfaces, or carbonous coatings.