

Structure – Properties Relationship of Thermoset and Thermoplastic Nanocomposites Filled with Fly Ash

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Abstract:

In this work the physicochemical properties of polymer/fly ash composites have been examined in relation to the nature of the matrix (thermosets and thermoplastics) and the surface modification of the filler as well. Pristine fly ash and that modified with organosilanes of the type $(RO)_3SiCH_2NH_2$ and $(RO)_3SiCH_2CH_3$ have been incorporated respectively into epoxy resin DGEBA (thermoset) and polystyrene-b-polybutadiene (PS-b-PB) (thermoplastic) matrices. Details for sample preparation are presented elsewhere [1, 2].

Scanning electron microscopy (SEM) was used to clarify the dispersion and the degree of aggregation/agglomeration of fly ash particulates in the matrix.

Pristine and modified materials as well as the final nanocomposites were characterized by a combination of analytical techniques including FT-IR, DMA, DSC and XRD. FT-IR spectra indicate the existence of surface modified fly ash in the final composite. DMA and DSC measurements show a clear dependence of the dynamic properties of the composites with the same filler loading on the matrix nature. The effect of surface modification is probably attributed to better compatibility of the modified filler with the matrices.

References

[1] A. Stimoniaris, H. Zois, A. Kanapitsas, M. Karakassides, C. Delides, 6th International Conference on Structural Analysis of Advanced Materials, ICSAAM 2015, 08-11 September, Porto, Portugal.

[2] E. Skoura, A. Karanastasis, A. Z. Stimoniaris, A. Avgeropoulos, M. Karakassides, D. Gournis, 7th Panhellenic Symposium on Porous Materials, June 2nd-4th 2016, Ioannina, Greece.