

EB TREATMENT OF CARBON NANOTUBE-REINFORCED POLYMER COMPOSITES

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A small amount - less than 0.5% - carbon nanotube reinforcement may improve significantly the mechanical properties of epoxy based composite materials. The basic technical problem is on one side the dispersion of the nanotubes into the viscous matrix resin. Namely the fine, powder-like - less than 100 nanometer diameter - nanotubes are prone to form aggregates. On the other side, the good connection between the nanofiber and matrix, - which is determining the success of the reinforcement, - requires some efficient adhesion promoting treatment.

After an elaborate masterbatch mixing technology we applied Electron Beam treatment of epoxy-matrix polymer composites containing carbon nanotubes in presence of vinylester resins.

The Raman spectra of vinylester-epoxy mixtures treated by an 8 MeV EB showed the advantage of the electron treatment. Even in the case of partially immiscible epoxy and vinylester resins, the anchorage of carbon nanotubes reflects improvement if a reasonable 25 kGy EB dose is applied. Atomic Force Microscopy as well as mechanical tests on flexural and impact properties confirm the benefits of EB treatment.

Simultaneous application of multiwall carbon nanotubes and „conventional” carbon fibers as reinforcement in vinylester modified epoxies results in new types of hybrid nanocomposites as engineering materials. The bending- and interlaminar properties of such hybrid systems showed the beneficial effect of the EB treatment.

Acknowledgment: This work has been supported by the New Hungary Development Plan (Project ID: TÁMOP-4.2.1/B-09/1/KMR-2010-0002).

References

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