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Composite of epoxy and multi-walled carbon nanotubes produced from camphor/ferrocene pyrolisis: dynamic mechanical thermal properties

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Abstract – Multi-walled carbon nanotubes (MWCNT) produced from camphor-ferrocene were dispersed in epoxy resin DGEBA at concentrations of 0,1-1% wt without any solvent addition, and cured with DDM hardener. Dynamic mechanical thermal properties revealed that the storage modulus is until 4 times higher than neat epoxy for nanotubes without any purification or functionalization.

The carbon nanotubes are largely investigated for application in nanocomposites due their excellent mechanical properties (). In this study, multi-walled carbon nanotubes (MWCNT) composites with epoxy resin (Araldite GY260) were cured using hardener DDM (H972) without addition of any diluents.
The MWCNT powder was synthesized by pyrolysis of camphor mixed with 16% of ferrocene as catalyst, at 850ºC, in atmospheric pressure. The influence of deposition time (or mass of camphor mixture pyrolised) on MWCNT dispersion in epoxy was investigated. The deposition time can cause variation in both length and density of nanotube powders. Raw MWCNT were used, without any purification or functionalization, just milling. The length of MWCNT produced and the dispersion degree for different concentration of MWCNT were evaluated by scanning electron microscopy (SEM). Thermomechanical properties were evaluated by SII EXSTAR 6000 DMS 6100 system at 1Hz, amplitude of 10um, and a temperature range of 25 to 250ºC. Figure 1 shows a typical image of MWCNT powder produced, and figure 2 shows a graph of storage modulus for different MWCNT concentrations.

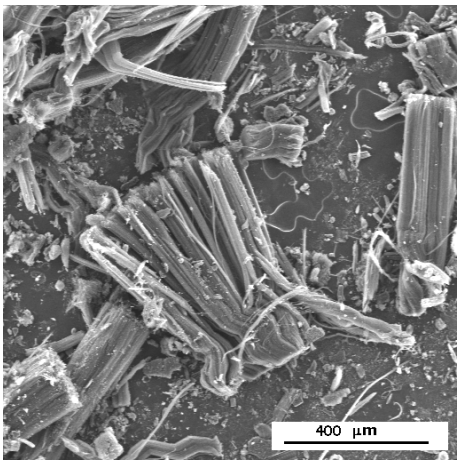

Figure 1: MWCNT produced by pirolysis of camphor/ferrocene

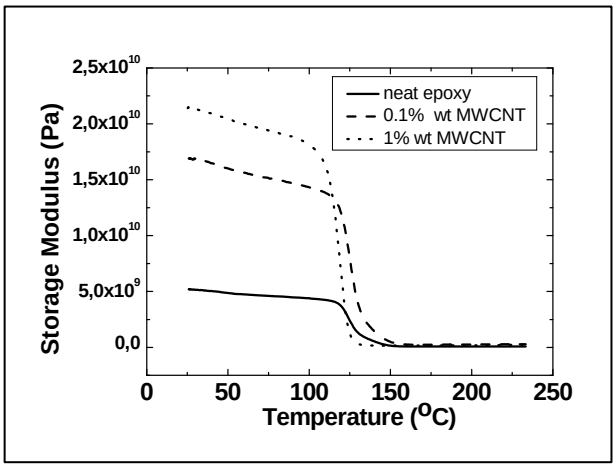

Figure 2: (a)Storage Modulus of MWCNT composites at different concentrations without any purification or functionalization produced at

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