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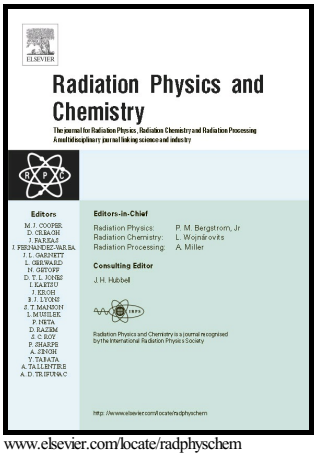

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Microstructure aspects of radiation-cured networks: cationically polymerized aromatic epoxy resins

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Abstract: The thermo-mechanical properties and nanostructural features of epoxy aromatic resins cationically cured by UV-visible or electron beam radiation have been studied by FT-NIR spectroscopy, dynamic mechanical analysis (DMA), dielectric spectroscopy (DS), and atomic force microscopy (AFM). The influence of formulation (nature and content of onium salt) and of curing parameters (doses, thermal treatment) on the thermophysical have been investigated. The presence of several relaxation domains observed by DMA and DS analysis confirms the presence of heterogeneities in the cured materials. Network formation is described by the percolation of glassy nanoclusters which are evidenced by AFM analyses. AFM probing by quantitative nanomechanical measurements confirms the gradual build-up of the local Young's modulus in good agreement with the macroscopic value.

Keywords: cationic polymerization, aromatic epoxy monomers, glass transition, network properties, radiation curing, atomic force microscopy, dynamic mechanical thermal analysis, dielectric spectroscopy