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Tg and Cure of a Polycyanurate at the Nanoscale SINDEE SIMON, QINGXIU LI, Texas Tech University — Nanoscale constraint is known to have a significant impact on the thermal properties of materials. Although thermosetting resins have been cured in the presence of nanoparticles and nanotubes, cure of thermosetting resins under the well defined nanoscale constraints imposed by controlled pore glass (CPG) or similar matrices has not been previously documented. In this work, we investigate the isothermal curing under nanoscale constraint of a thermosetting resin, bisphenol M dicyanate ester (BMDC), which trimerizes to form a polycyanurate network material. Differential scanning calorimeter is used to monitor the evolution of the glass transition temperature (Tg) and the conversion during cure as a function of the diameter of the silanized control pore glass matrix which is used for confinement. A Tg depression is observed for both the bisphenol M dicyanate ester monomer and the polycyanurate networks; the depression is only a few degrees for the monomer, whereas a 56 K depression is observed for the "fully-cured" network in 11.5 nm pores. The nanoscale constraint is also found to accelerate the cure of the bisphenol M dicyanate ester, but it does not affect the normalized Tg versus conversion relationship. The appearance of a secondary Tg above the primary Tg in the smaller pores and the associated length scale are discussed.

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