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Glass Transition Temperature Gradient evidenced by NMR and Calorimetry FRANCOIS LEQUEUX, HELENE MONTES, SIMM/ESPCI Paris France, AURELIE PAPON, SILCEA, LAURENT GUY, SILCEA Rhodia France, KAY SAALWAECHTER, Halle University Germany — Polymer, when confined, exhibit a dynamics different from the bulk one. However, measurements on unique films are rather difficult. One of the commonly accepted hypothesis is that there is a gradient of glass transition temperature in the vicinity of the solid surfaces. We have developed since ten years model nano-composite systems consisting in monodisperse spherical particles dispersed in an elastomer matrix. From Neutron Scattering, we can deduce the density of polymer located at any distance from any silica surface. We have then measured by NMR the magnetization relaxation at various temperatures above the glass transition temperature and its vicinity. From these measurements we were able to fit the whole set of data at various temperatures by a unique relation for the glass transition temperature Tg as a function of the distance z from a solid surface $Tg(z)=Tg(1+\delta/z)$, with a unique parameter δ. In addition, the same law holds with the same parameter δ in the presence of solvent. Moreover, the parameter measured by NMR allows predicting quantitatively the Differential Scanning Calorimetry response, even after an aging step.

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