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Payne effect in model nanocomposite the role of polymer confinement HELENE MONTES, FRANÇOIS LEQUEUX, ESPCI-Paristech, PAPON AURELIE TEAM — Payne effect is a non-linearity observed in polymer nanocomposites at small strain amplitudes, abiove the bulk glass transition temperature. The origin is the non-linear mechanical response of the polymer located near the solid fillers. However the exact nature of the mechanical response is still the object of debate. We have developed since ten years model nanocomposite systems consisting in monodisperse spherical particles dispersed in an elastomer matrix. Thanks to NMR and Neutrons scattering, we have been able to determine precisely the amount of polymer confined between pairs of particles and with a modified dynamics. From that we have deduced that the Payne effect clearly originates in two mechanisms: i) around each particle, a glass transition temperature gradient ii) around this first layer, a modified topology of the polymer –originating itself in the glassiness of the polymer very near the particles. Hence, we are able to build a master curve for the Payne effect amplitude versus the number of particles connected to their neighbors by these two layers, that gathers measurements at various temperatures, volume fractions and frequencies.

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