Supplementary Material (ESI) for Soft Matter

Supporting Online material for

Miscibility-Dispersion, Interfacial Strength and Nanoclay Mobility Relationships in Polymer Nanocomposites.

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Figure 1 shows the dielectric loss values (ε") for unfilled and vulcanized NR (left) and the unvulcanized NR (without any curing agent) containing 10 phr of Q-I nanoclay (right) as a function of frequency at 363 K. The analysis of the relaxation mode corresponding to the interfacial adsorbed polymer in the available frequency window for the nanocomposite sample is shown using one HN-functions (blue dash-dot line curve) and a conductivity contribution (green dash-dot line line). As it was commented in the manuscript there was not evidenced of the relaxation corresponding to the interfacial adsorbed polymer in the unfilled sample.

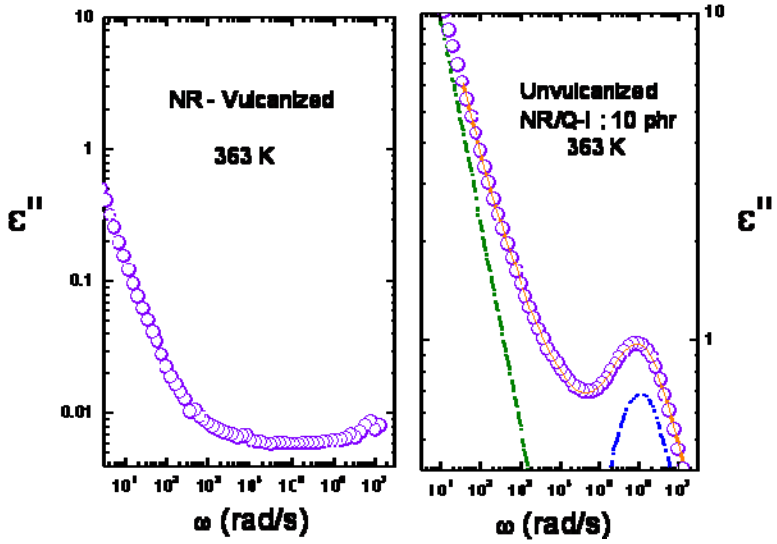

Figure 1.

Figure 2 (left) shows the dielectric loss, *ε”*, versus temperature (isochronal representation) for the nanocomposite containing 15 phr of Q-I nanoclay in the dry state as well as in the swollen state. Dry vulcanized NR/Q-I shows a main peak at 240 K, which can be assigned to the segmental relaxation, the secondary relaxations at low temperatures (below Tg) can be assigned to the localized motion in the glassy state and the relaxation peak at 325 K is related with the polymer chains adsorbed at the inorganic surface of the nanoclay. A significant change on the molecular dynamics in the swollen samples was evidenced. The physical constrains present in the dry samples are no longer effective because of the slippage of the entanglements, so the swelling process induces the shifting to lower temperatures the peaks corresponding with the dynamics of the bulk chains and the rubber chains around the nanoclay due to the much faster chain dynamics. Figure 2 (right) also shows the shifting at lower frequencies with the time of the relaxation of the polymer at the interface during the crosslinking process at 363 K.

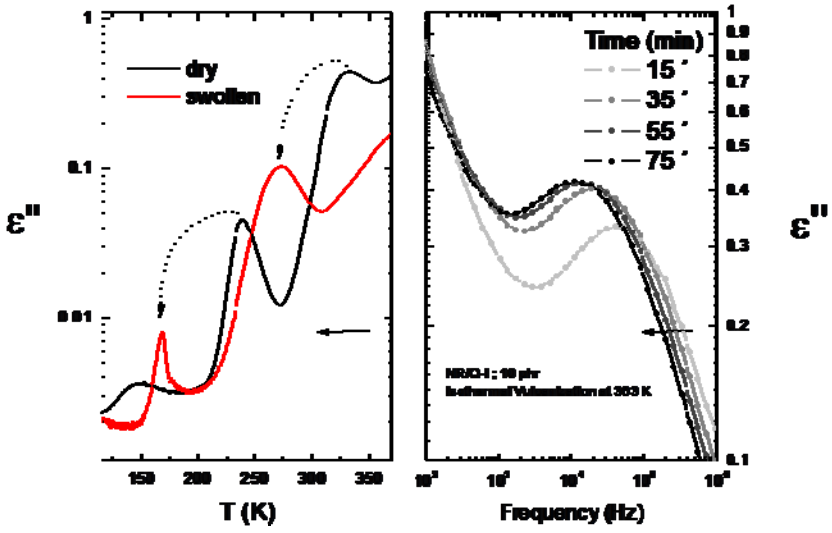

Figure 2.