The Role of Hard Segment Content on the Molecular Dynamics of Poly(tetramethylene oxide) Based Polyurethane Copolymers

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Supporting Information:

"Conductivity-Free" Dielectric Loss

Above T_g, the contribution from ohmic conduction (σ_{DC}) arising from ionic impurities dominates the dielectric loss (ε"), masking processes at high temperatures. This conduction contribution is not manifested in the real part of the dielectric response (ε') and using a numerical approach one can approximate the "conduction free" loss from ε'. We chose to apply the straightforward derivative method to achieve this, where the ohmic-conduction-free loss is determined from the logarithmic derivative of the dielectric constant:[20-21]

$$\varepsilon''_D = -\frac{\pi}{2}\frac{\partial\varepsilon'(\omega)}{\partial \ln\omega} \tag{3}$$

This method has been shown by Wubbenhorst et al. to be a very good approximation of the "conduction-free" loss for relatively broad loss peaks like those observed here, while narrow peaks appear much narrower in ε''_D than in ε''.[21] A comparison of ε'' and ε''_D for 32.5% hard

segments is shown in figures S1 a and b as a representative example.

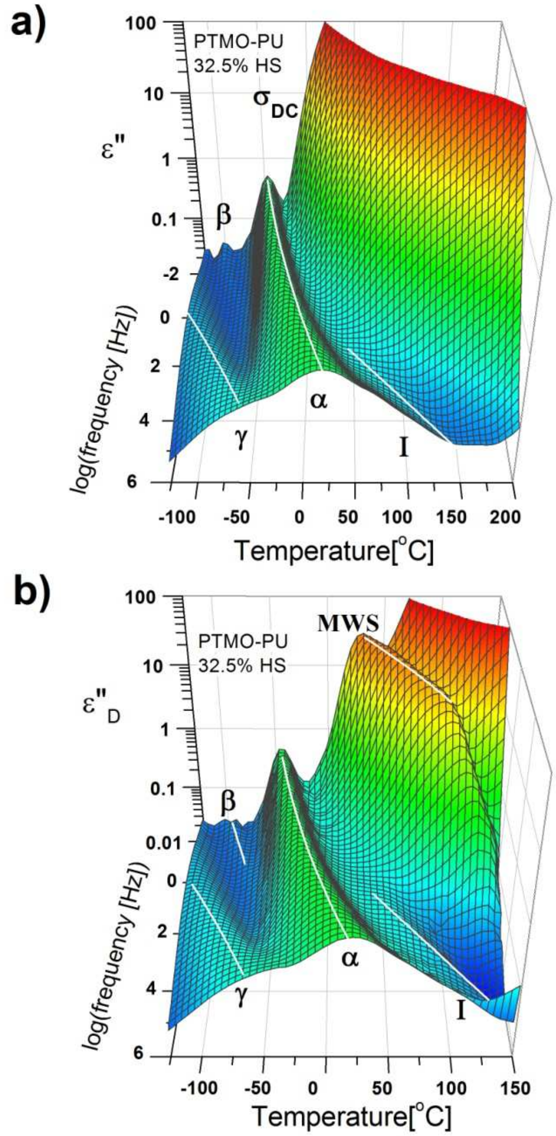

Figure S1: a) ε'' and b) ε''_D for PTMO-PU at a hard segment content of 32.5%. The removal of the conductivity contribution to the loss reveals the presence of the MWS process.