



**MORPHOLOGY EVOLUTION DRIVEN BY TRANSREACTIONS DURING THE REACTIVE BLENDING OF
A THERMOPLASTIC POLYURETHANE AND AMINO-TERMINATED POLYDIMETHYLSILOXANE
OLIGOMERS**

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The reactive blending of a thermoplastic polyurethane (TPU) with alpha,omega-aminopropyl polydimethylsiloxane oligomers (amino-PDMS) has been carried out at high temperature. The morphology of the resulting material was first governed by the very fast reaction of the amino groups of the PDMS with the isocyanate groups coming from the splitting of the urethane bond. At this stage, all the amino groups were converted to alkyl-aryl ureas and a transparent segmented polyurethane-co-PDMS copolymer was formed with a very fine nanoscale morphology (figure 1, A and B). In a second stage, transreactions combined with the high immiscibility of the phases tended to reorganize the copolymer macromolecular structure so that the siloxane segment length increased. The consequence of this change of chain architecture was a coarsening of the morphology accompanied by a loss of transparency (Figure 1, C and D). It was evidenced by ¹H NMR spectroscopy that the molecular structure evolution of the polymer was due to an increase in the proportion of alkyl-alkyl ureas at the expense of the initial alkyl-aryl ureas. Finally for comparison, the same TPU was melt blended with a thermoplastic polydimethylsiloxane-urea. The high incompatibility of the two polymers should have produced a coarse morphology, however as the size of the PDMS domains (50-200 nm) was much smaller than that expected, we assume that a copolymer was formed at the interface since urethane/urea transreactions were likely to occur. Although in this case the newly formed alkyl-aryl urea bonds were in too small proportions to allow their accurate quantification by ¹H NMR.