

**EFFECT OF SOFT SEGMENT COMPONENTS ON  
MECHANICAL PROPERTIES AT LOW  
TEMPERATURES FOR SEGMENTED  
POLYURETHANE ELASTOMERS**

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**ABSTRACT**

Dependence of mechanical properties at low temperature on the chemical structure and molecular weight of soft segment was discussed with regard to segmented polyurethane (SPU). Cast films with various molecular weights ( $M_n$ ) and with various composition ratios of polytetramethylene glycol (PTMG) and polypropylene glycol (PPG) were used. Segmented polyurethanes having copolymerized soft segments consisting of PTMG and PPG had a single glass transition temperature corresponding to  $M_n$  and composition ratio. Dependence of low-temperature elastic recovery on recovery time, measurement temperature and  $M_n$  and composition ratio of soft segments was clarified. Stress-induced crystallization of soft segment was reduced by copolymerizing, and elastic recovery at low temperature was improved. SPU with a higher  $M_n$  of soft segment had a higher retention ratio of strain energy on cyclic deformation. SPU with a higher  $M_n$  of soft

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segment also had a higher retention ratio of stress. The retention ratio of stress for SPU synthesized by copolymerizing PPG ( $M_n=1000$ ) with PTMG ( $M_n=2000$ ) decreased with an increase in the copolymerization ratio of PPG. This fact is considered to be due to a rise in the glass transition temperature.

**Key words:** segmented polyurethane, elastic recovery, hysteresis, dynamic mechanical property, soft segment