Electronic Supplementary Material (ESI) for RSC Advances.

Designing Temperature-Memory Effects in Semicrystalline Polyurethane

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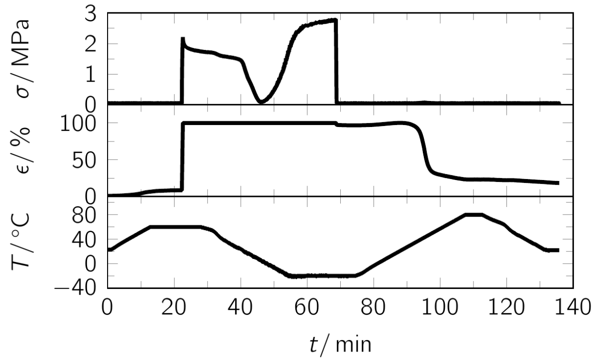
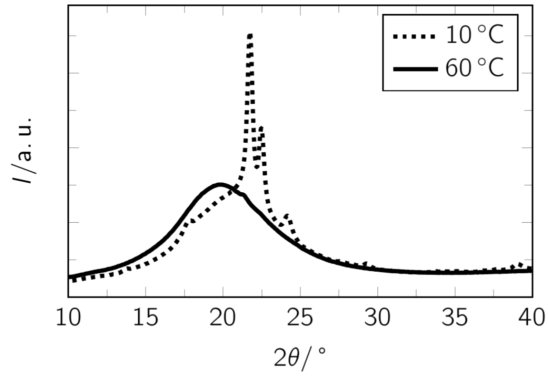
ESI Figures and Figure Captions

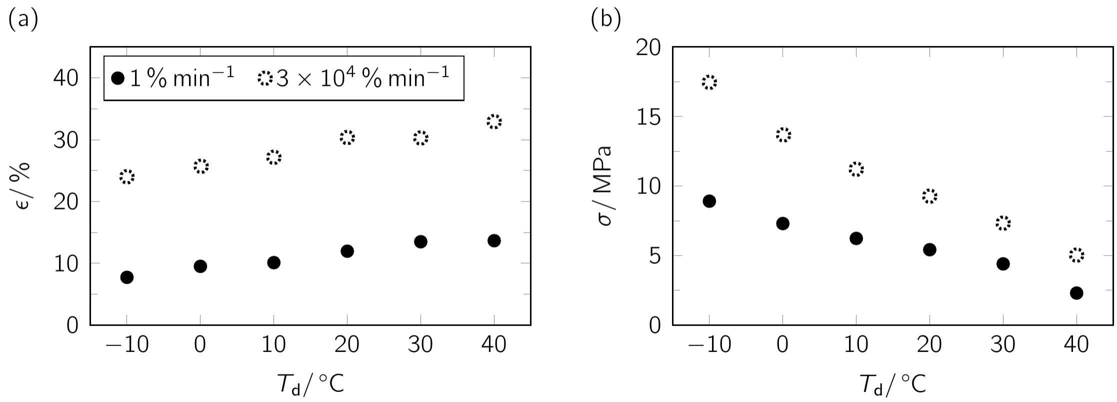


ESI Fig. 1: Programming and shape-memory properties under stress-free recovery conditions for tensile bars (DIN EN ISO 527-2:1996) made of Desmopan DP 2795A SMP. The individual programming steps included heating from 23 to 60 °C, tensile deformation in which a maximum strain of 100% was applied, cooling to –20 °C and unloading. To induce the shape-memory effect, the specimen was heated to 80 °C with a rate of 3 °C min^{-1}.

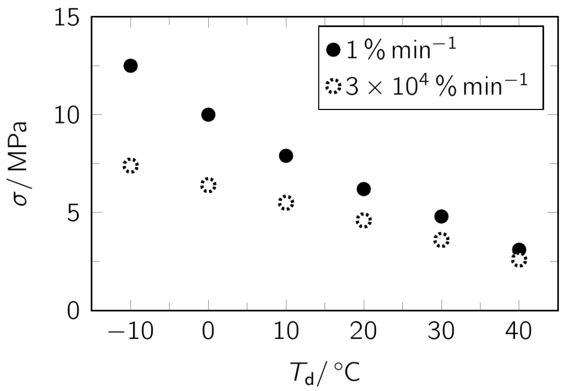
As a result of programming, 97% of the applied strain could be fixed. It can be seen that the specimen started shape recovering at about 37 °C. At the end of the recovery process, a strain of 23% was recorded.



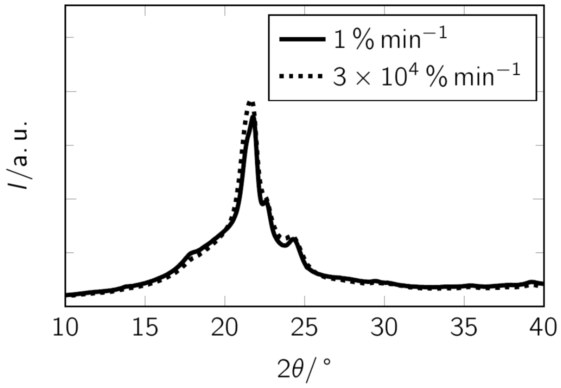
ESI Fig. 2: WAXS diffractograms of pristine PEU recorded at 10 and 60 °C.



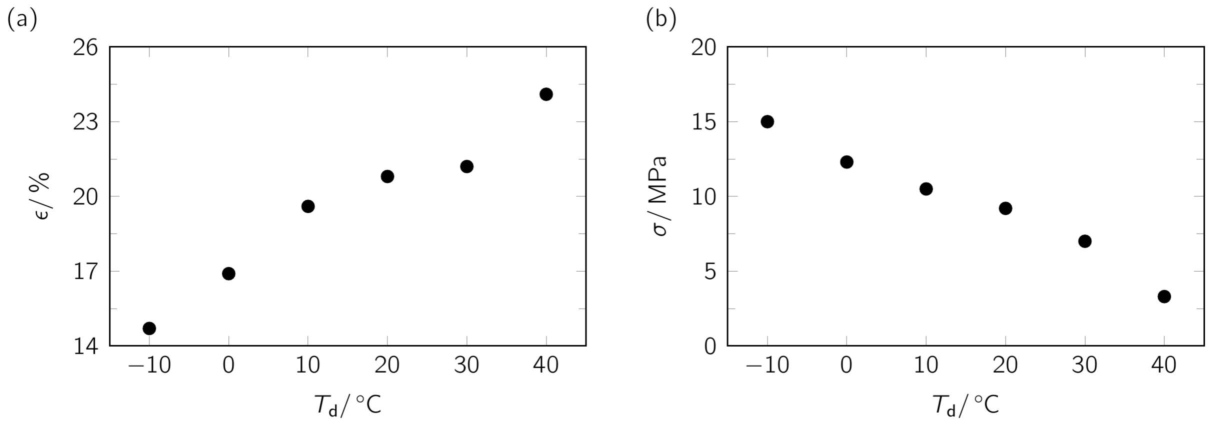
ESI Fig. 3: Strain and stress at yield for PEU at different deformation temperatures, depending on the applied strain rate (ε' = 1 % min^{-1} and 3 × 10^{4} % min^{-1}). The associated experimental data was taken from Fig. 2b. The size of the symbols was larger than the calculated errors.



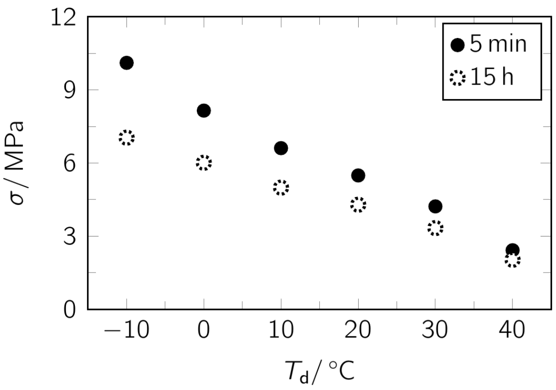
ESI Fig. 4: Stress recorded after keeping PEU for 5 min at T_d, depending on the applied strain rate. The size of the symbols was larger than the calculated errors.



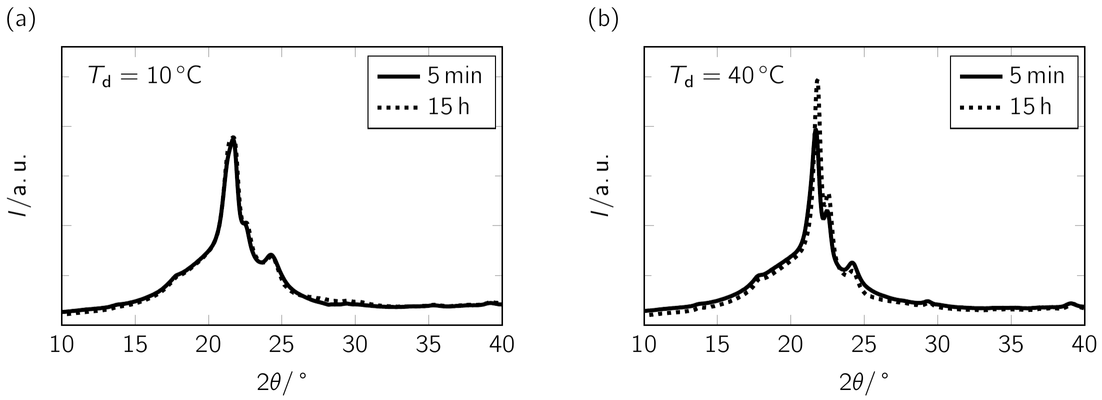
ESI Fig. 5: WAXS diffractograms of programmed PEU (T_d = 10 °C, ε' = 1 % min^{-1} and 3 × 10^4 % min^{-1}) recorded at 10 °C.



ESI Fig. 6: Temperature dependence of strain and stress at yield for PEU ($\varepsilon' = 3 \times 10^2$ % min^{-1}). The associated experimental data was taken from Fig. 6b. The symbol size was larger than the calculated errors.



ESI Fig. 7: Residual stress before unloading of PEU at T_{d}, depending on temperature holding time after deformation. The size of symbols was larger than the calculated errors.



ESI Fig. 8: WAXS diffractograms of programmed PEU (ε' = 3 × 10^2 % min^{-1}) recorded at 10 °C. Influence of temperature holding time t_h for T_d = 10 °C (a) and 40 °C (b).