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Effect of temperature on segmental mobility is reduced, but not eliminated during constant strain rate deformation of poly(methyl methacrylate) glasses[1] KELLY HEBERT, BENJAMIN BENDING, JOSH RICCI, M.D. EDIGER, Univ of Wisconsin, Madison — Deformation of polymer glasses is typically nonlinear and not understood at a molecular level. During deformation, segmental motion in polymer glasses can be accelerated by over a factor of 1000. While temperature has a big impact on the segmental motion of polymer glasses in the absence of deformation, some workers suggest that segmental mobility in polymer glasses undergoing deformation should be independent of temperature. We have measured segmental mobility in poly(methyl methacrylate) glasses during constant strain rate deformation at four different temperatures using a probe reorientation method. We find that during deformation, the dependence of segmental mobility on temperature is significantly reduced, though not eliminated. This is in qualitative agreement with the work of Chen and Schweizer. We also find that the KWW β parameter increases during deformation, indicating a narrower distribution of segmental relaxation times. At a given strain rate, this increase of the KWW β parameter is larger at lower temperature.

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