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Exploring conditions for craze initiation and for absence of crazing in polymer glasses[1] SHIWANG CHENG, PANPAN LIN, SHI-QING WANG, University of Akron — Although crazing in polymer glasses has been extensively studied in the past, it is still difficult to predict and explain when and why crazing would take place. There is even a recent proposal to suggest [1] that craze initiation is "a frustrated fracture process than rather a yield mechanism" [2]. In this work, we report the variable parameters that influence crazing. Specifically, we show that a "young" glass (prepared by mechanical "rejuvenation") can resist crazing and aging promotes crazing. Thus, the degree of vitrification is one variable. Under creep, crazes form faster at a higher tensile stress, showing that crazing is an activation process and depends on the external condition. We also show how the large-scale structure such as the degree of chain networking affects crazing behavior. For example, melt stretching suppresses crazing. Finally, we demonstrate crazing in absence of any ongoing extension when a cold-drawn polymer glass is held fixed when annealing well below T_g during the elastic yielding [3]. These new observations have inspired a molecular picture for large deformation of polymer glasses [4].

[1] *Polymer* 2007**,** *48*, 1030;
[2] *Polymer* 2011**,** *52*, 2319;
[3] *Phys. Rev. Lett.* 2013, *110*, 065506;
[4] submitted to Polymeric Glasses session.

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