

Webinar

Effect of Fragility of Glass-Formers in the Yielding Transition under Oscillatory Shear

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We investigate the role of fragility in the yielding behaviour of glass-formers under oscillatory shear using computer simulations. By tuning the fragility through various protocols, we observe that fragile glasses exhibit a significant increase in the yield point with cooling, accompanied by a pronounced stress drop at yielding—characteristic of brittle behaviour. In contrast, strong glasses show minimal variation in the yield point and undergo more ductile yielding.

Extending our analysis beyond yielding, we probe the role of fragility in memory formation. We observe that memory encoding is more difficult in strong glass-formers than fragile ones, especially for bulk systems.

We further explore memory formation in amorphous solids subjected to random driving. Contrary to the prevailing view that deterministic cyclic shear is essential for memory encoding, our findings demonstrate that disordered systems can develop memory even under simple random driving protocols. This observation is reminiscent of everyday materials such as clothes and shoes, which retain their shape and history through irregular usage. Our results suggest a broader, more general mechanism for memory formation in amorphous materials.



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