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Stable glass transformation to supercooled liquid via surface-initiated growth front MARK EDIGER, STEPHEN SWALLEN, KATHERINE TRAYNOR, ROBERT MCMAHON, University of Wisconsin-Madison, THOMAS MATES, University of California-Santa Barbara — Recently it has been established that vapor deposition onto substrates at 0.85 T_g can produce high density, high stability, low enthalpy glasses. These glasses may be the most stable ever produced in a laboratory (using the glass formed by cooling the liquid as the reference state). Here we use SIMS to observe the transformation of isotopically layered stable glasses of trisnaphthylbenzene into a liquid during annealing above T_g. In contrast to the predictions of standard models, the observed transformation is spatially heterogeneous. The liquid grows into the stable glass with sharp growth fronts initiated at the free surface and at the interface with the substrate. For the free surface, the growth velocity is constant in time and has the same temperature dependence as self-diffusion in the equilibrium supercooled liquid. These stable glasses are packed so efficiently that defects such as surfaces and interfaces are required to initiate the transformation to the liquid even well above T_g.

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