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Structural signal of a dynamic glass transition[1] SUDESHNA CHATTOPADHYAY (BANDYOPADHYAY), AHMET UYSAL, BENJAMIN STRIPE, GUENNADI EVMENENKO, PULAK DUTTA, Department of Physics and Astronomy, Northwestern University, STEVEN EHRLICH, Brookhaven National Laboratory, EVGUENIA A. KARAPETROVA, Argonne National Laboratory — Conventional wisdom states that there is no significant difference between the static structures of the glass and liquid states of a given material. Using x-ray reflectivity, we have studied pentaphenyl trimethyl trisiloxane, an isotropic liquid at room temperature with a dynamic glass transition at 224K. Surface density oscillations (surface layers) develop below 285K, similar to those seen in other metallic and dielectric liquids and in computer simulations [1]. Upon cooling further, there is a sharp increase in the penetration of the surface layers into the bulk material, i.e. an apparently discontinuous change in the static structure, exactly at the glass transition (224K) [2].

[1]. e.g. O. M. Magnussen et al., PRL 74, 4444 (1995); H. Mo et al. PRL 96, 096107 (2006); E. Chac'on et al., PRL 87, 166101 (2001)
[2] S. Chattopadhyay et al, PRL 103, 175701 (2009)

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