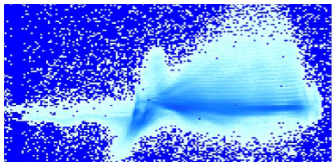

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Reaching the Yield Point of a Glass During X-Ray Irradiation

Monday, June 17, 2024 9:05 AM (30 minutes)

A solid loaded beyond the yield stress loses its elastic properties and becomes plastic. From a microscopic point of view, this limit corresponds to the condition where plastic regions become so densely packed that they give rise to system-spanning structures. This limit for glasses is abrupt, which makes experimental in-vestigations challenging. Here, the yield point is reached by the alternative ap-proach of increasing the density of plastic regions by generation of point defects during x-ray irradiation. For the case of a LiBO2 glass, we show that at low doses, i.e., for a low density of defects, the defects behave as isolated stress sources that induce atomic displacements typical of an elastic solid. As the density of defects in-creases, the mechanical response of the glass at the local scale changes from elastic to more and more plastic, until reaching the limit where it becomes charac-teristic of a flowing system, which signals that the yield point is reached.

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