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Volume Recovery of Polymeric Glasses: Application of a Capacitance-based Measurement Technique NAZAM SAKIB, SINDEE SIMON, Texas Tech Univ — Glasses, including polymeric glasses, are inherently non-equilibrium materials. As a consequence, the volume and enthalpy of a glass evolve towards equilibrium in a process termed structural recovery. Several open questions and new controversies remain unanswered in the field. Specifically, the presence of intermediate plateaus during isothermal structural recovery has been reported in recent enthalpy work. In addition, the dependence of the relaxation time on state variables and thermal history is unclear. Dilatometry is particularly useful for structural recovery studies because volume is an absolute quantity and volumetric measurements can be done in-situ. A capillary dilatometer, fitted with a linear variable differential transducer, was used previously to measure volume recovery of polymeric glass formers in our laboratory. To improve on the limitations associated with that methodology, including competition between the range of measurements versus the sensitivity, a capacitance-based technique has been developed following the work of Richert, 2010. The modification is performed by converting the glass capillary dilatometer into a cylindrical capacitor. For precision in capacitance data acquisition, an Andeen-Hagerling ultra-precision capacitance bridge (2550A, 1 kHz) is used. The setup will be tested by performing the signatures of structural recovery as described by Kovacs, 1963. Experiments are also planned to address the open questions in the field.

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