

Abstract Submitted
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Heat Capacity, Crystallization, and Nucleation in Poly(vinyl alcohol) Thin Films¹ DAVID THOMAS, Tufts University, ANDREAS WURM, EVGENY ZHURAVLEV, University of Rostock, CHRISTOPH SCHICK, University of Rostock, PEGGY CEBE, Tufts University — Polyvinyl alcohol (PVA) is hydrophilic, biodegradable, semi-crystalline polymer with a wide array of applications ranging from textiles and packaging to medicine. Despite possessing favorable properties, PVA thermally degrades at temperatures just in excess of 200 C which occurs slightly below the observed peak endothermic melting peak at 203 C. Utilizing fast scanning calorimetry it is possible to minimize sample degradation allowing measurements of the liquid phase heat capacity as well as study nucleation and crystallization from the amorphous melt state. Samples cut from parent films 2-3 μm thick were placed on UFSC1 sensors and brought between -80 and 270 C at rates of 2000 C/s under a nitrogen atmosphere. After five complete cycles samples did not show any signs of degradation. By fitting the symmetry corrected glassy phase heat capacity with literature values for the specific heat capacity from the ATHAS databank sample masses were determined to vary between 15-50 ng. Homogeneous nucleation was observed for all samples cooled from the melt with peak temperature 123 C. Fitting linear heat capacity baselines in the melt and glassy states it was possible to obtain an experimental measurement of the heat capacity increment 44.5 J/mol K at the glass transition 85 C.

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