Abstract Submitted
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Novel Technique for Quantitative Fast Scanning Calorimetry on Electrospun Fibers[1] DAVID THOMAS, NELAKA GOVINNA, Tufts Univ, CHRISTOPH SCHICK, Univ of Rostock, PEGGY CEBE, Tufts Univ — Fast scanning chip calorimetry allows for the study of polymers which have rapid nucleation and/or crystallization kinetics, or degrade within their melting range. Heating rates used, up to 4000 K/s, allow studies of hetero and homogeneous nucleation at time scales inaccessible with conventional calorimeters, whose rates are typically <0.5 K/s. Polyethylene terephthalate (PET) and polyvinyl alcohol (PVA) were chosen in the development of a new methodology to obtain quantitative fast scanning thermal data from electrospun nanofibers using a Flash DSC1. The structure of nanofibers requires special methods to load nanogram-sized samples onto a UFSC1 sensor. Fibers were directly spun onto TEM grids which provide a durable substrate to support bundles of nanofibers and possess excellent thermal conductivity allowing for a strong, repeatable signal and ensure good sample to sensor contact. As spun samples were held isothermally at temperatures ranging from T_g to T_m then heated at 2,000 K/s to assess as-spun crystallinity and cold crystallization behaviors. Above T_m the fibers break up into micro- and nano-droplets. On these samples, melt crystallization experiments were performed to study nucleation and crystallization of polymer confined to nanodroplet morphology.

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