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**Thermal Properties of Silk Fibroin Using Fast Scanning Calorimetry**[1] PEGGY CEBE, BENJAMIN PARTLOW, DAVID KAPLAN, Tufts University, ANDREAS WURM, EVGENY ZHURAVLEV, CHRISTOPH SCHICK, University of Rostock — We performed fast scanning chip-based calorimetry of silk protein using the Mettler Flash DSC1. We suggest the methodology by which to obtain quantitative information on the very first scan to high temperature, including the melting endotherm of the beta pleated sheets. For proteins, this first scan is the most important one, because the crystalline secondary structural features, the beta pleated sheets, melt after the first heating and cannot be thermally reintroduced. To obtain high quality data, the samples must be treated to drying and enthalpy relaxation sequences. The heat flow rates in heating and cooling must be corrected for asymmetric heat loses. We evaluate methods to obtain an estimate of the sample mass, finally choosing internal calibration using the known heat capacity increment at the glass transition. We report that even heating at rates of 2000 K/s, thermal degradation of silk cannot be totally avoided, though it can be minimized. Using a set of nineteen samples, we successfully determine the liquid state heat capacity of silk as: $C_p^{liquid}(T)$ = (1.98 +0.06) J/gK + $T$ (6.82 +1.4) x$10^{-4}$ J/g$K^2$. Methods for estimation of the sample mass will be presented and compared.

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