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Heat Capacity of *B. Mori* Silk Fibroin Based on the Vibrational-Motion of Poly(amino acid)s. MAREK PYDA, Rzeszow University of Technology, XIAO HU, PEGGY CEBE, Tufts University — *Bombyx mori* silk fibroin heat capacities with and without water have been determined based on the vibrational motions of poly(amino acid)s and water, using the Advanced Thermal Analysis System (ATHAS) Data Bank. The heat capacities, C_p, of dry silk and silk-water were linked to their vibrational spectra based on the group and skeletal vibration contributions. For dry silk, the experimental and calculated C_p agree to better than $\pm 3\%$ between 200 K and 435 K. The heat capacity of the solid silk-water system, below the glass transition, was estimated from a sum of linear combinations of the molar fractions of the vibrational heat capacities of dry silk and glassy water. Calculations are compared to experimental data obtained from calorimetric methods, using hermetic and non-hermetic pans. The approach presented allows one to predict the low temperature vibrational heat capacity for dry silk and for the silk-water system down to zero kelvin, and, together with an extension to higher temperatures, above the glass transition. This can be used as a reference baseline for quantitative thermal analysis of this biomaterial..

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