

## Thermal Property Measurements of Spider Silks

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To extract the thermal conductivity, thermal diffusivity and possibly volumetric heat capacity of micro- to nano-scale size fine fibers, the samples, which are undergoing either a constant or modulated Joule heating, are suspended between two heat sinks. Modeling of the heat transfer process through the samples is improved from the literature analyses by incorporating the heat loss contribution on the heated fibers. The magnitude of such influence is determined by a dimensionless parameter by which samples having low thermal conductivity and large aspect ratio receive significant impact. In addition to the modeling melioration, a series of measures are developed to improve the sample preparation, experimental operation and data reduction especially for the metal coated electrically non-conductive fibers. The developed models are validated by the thermophysical property measurements of platinum wires and glass fibers. With consistent calibration results to the literature values, the techniques are employed for the thermal property determination of natural and synthetic spider silks.