Measurement of Specific Heat Capacity of Gelatin for Human Phantom using Differential Scanning Calorimetry

Junichi Fujino C, S and Tomohiro Honda
Fukuoka University, Department of Mechanical Engineering, Fukuoka, Japan
fujino@cis.fukuoka-u.ac.jp

In Japan, gelatin and agar are extensively used as a basic ingredient of human phantom. Although the specific heat and thermal conductivity of the gelatin and agar are essential to be discussed in terms of the heat transfer inside the phantom, there is little information concerning the thermophysical properties of them. This paper deals with measurements of the specific heat capacity of the granulated gelatin and gelatin gels. The granulated gelatin derives from bovine bones. The specific heat capacity is measured using a heat-flux differential scanning calorimeter. The specific heat capacity of the granulated gelatin increases from 1.7 to 1.9 kJ/(kg·K) with increasing the temperature from 287 to 341 K. In addition, the variation in the data for 2 K/min is within ±5 %. Although the data for 5 K/min are about 2 % higher than those for 2 K/min, they agree within the variation range in the data for 2 K/min. The specific heat capacity of the gelatin gel decreases from 4.1 to 3.6 kJ/(kg·K) with increasing the gelatin content from 5.3 to 23.8 %. The variation in the data is within ±5 %. In addition, the measured data for the gelatin gel agrees well with the estimated value based on the specific heat capacity values of the both granulated gelatin and pure water, and it is within 5 %.