Bamboo as a New Thermoelectric Material

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Converting heat into electric power requires thermoelectric material to have high electrical conductivity but low thermal conductivity. This experiment cut Moso Bamboo, Phyllostachys edulis, and treated it through a high-pressure pressing method, submerging bamboo slides in a saturated NaCl and In-NPs (73 mg/ml) solution in a high temperature and high pressure environment (121℃、1.2 atm), to insert In-NPs and NaCl as a charge carrier in bamboo. A low-pressure sucking method was also used to further let the solution flow through the bamboo slide. After the treatment, this experiment used optical microscopes and X-Ray Diffraction to make sure that In-NPs and NaCl are inserted in the bamboo vascular bundle. The experiment then measured the electric resistance, thermal conductivity, Seebeck coefficient, and the change of current density with temperature differences between the two ends of the bamboo. The results show that, compared to the parent compound, the treatment method increased the electric conductivity 1720 times, while the thermal conductivity only increased by 33%; and the Thermoelectric Figure of Merit for the NaCl and In-NPs inserted bamboo is 0.059, making bamboo a new potential thermoelectric material.

Awards Won:

Second Award of $1,500