

## **IOBIOFLUIDS: THE NEW CONCEPT FOR THERMAL MATERIALS**

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**Keywords:** IoBiofluids, Plant and animal waste, Heat storage, Heat transfer

**Introduction:** Food and agro industrial waste can be an advantageous resource for energetic utilization through thermal energy processes [1]. Every year, over 220 million tons of food waste are produced in Europe [2], making the implementation of methods for its reuse an environmentally friendly and economically viable solution.

Materials that have the ability to concentrate heat in their system, releasing it afterwards to the environment or absorbing heat from its surroundings can be used in several heat transfer applications, contributing to reduce the energy consumption in home heating systems, air conditioning and industrial processes. Among these, cereals, fruits and sub-products of cephalopods fishing generate high amounts of waste materials such as peels, hard shells, seeds, stones and ink sacs (ISC). It has already been shown that some of these have a high heat storage capacity [3].

IoBiofluids, powders from natural resources (plant and animal residues) suspended in an ionic liquid, represent a viable heat transfer agent. However, the thermal properties of these materials, namely heat capacity, thermal diffusivity and thermal conductivity, are not known.

**Results and discussion:** From the experimental measurement of thermal diffusivity and heat capacity it was found that the thermal conductivity of walnut shell powder is greater than the thermal conductivity of the hazelnut shell powder. The heat capacity of the nut shell has higher values when compared to the other samples analysed. The thermal conductivity versus temperature study of suspensions containing 2% (w/w) of powdered samples in water and surfactant has also shown that the addition of several powders to this medium can heighten this property, making the application of fruit residues to heat transfer fluids a viable option [4].

The samples of ISC studied have a heat capacity comparable or 1.5 times that of liquid water ( $4 \text{ kJkg}^{-1}\text{K}^{-1}$ ). All these results show the high potential of ISC as heat storage material [5].

**Conclusions:** Considering this results, we can now proceed with the study of suspensions with this materials in ionic liquids (IoBiofluids) as an alternative to the existing heat transfer fluids and even to IoNanofluids.

**References:**

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