

Thermal Conductivity of Ionic Liquids and IoNanofluids - Experiment and Prediction

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An IoNanofluid is defined as a mixture of an ionic liquid with a nanomaterial. The thermal conductivity of several ionic liquids and IoNanofluids has been measured in our laboratory in the latest years between room 293 K and 343 K at 0.1 MPa [1-6]. These studies have shown that the thermal conductivity of the pure ionic liquids and IoNanofluids with MWCNT's is sensitive to the molecular constitution. The compounds studied can be separated into head group, an aliphatic side chain and an anion. Preliminary conclusions show that: - Changing the side chain length, the enhancement in the thermal conductivity increases, possibly due to a better interaction between this chain and the carbon nanotube surface (non-polar entities) that facilitates heat transfer - The change of the head group does not seem to affect the enhancement very much - For liquids that have the same cation, [C2mim or C4mim], and different anions, [N(CN)2], [C2H5OSO3] and [(CF3SO2)2N], the anion structure affects the enhancement very much - The enhancement in the thermal conductivity is strongly dependent on the weight/volume fraction of the carbon nanotubes present in the IoNanofluid and weakly dependent on temperature - Current nanofluid enhancement theories are not able to predict the values found New data on [P6 6 6 14][DCA], [P6 6 6 14][Br] and [C2mim][(CN)3] and their nanosystems with MWCNT's will be reported. The overall set of results will be used to generalize the preliminary conclusions above. A discussion on the theoretical models for ionic liquids and for the enhancements in the IoNanofluids will also be presented.

References

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