

Physicochemical Properties of (Multi-Walled Carbon Nanotubes + Ionic Liquid) Nanofluids

Marina Shevelyova, Gennady Kabo, Andrey Blokhin and Eugene Paulechka^{C, S}

Belarusian State University, Chemistry Department, Minsk, Belarus

paulechka@gmail.com

The nanofluids of carbon nanotubes (CNT) and room-temperature ionic liquids (ILs) are considered as promising materials for production of new electronic devices, coating and antistatic materials, heat transfer enhancers and so forth. Multiwalled CNT (MWCNT) with reproducible characteristics and high content of the title material have become commercially available. In this work, we report the results of heat capacity and density measurements for MWCNT – [C₄mim]BF₄ and MWCNT – [C₄mim]PF₆ systems. The nanofluids were prepared by thorough grinding of the components in an agate mortar according to ref 1. The heat capacities of MWCNT and the nanofluids over the temperature range (80 to 370) K were measured in an adiabatic calorimeter. No phase transitions were found in the heat capacity curves of MWCNT. The glass transition temperatures of ILs in the nanofluid coincided with that of pure ILs. It was found that each component has an additive contribution to the heat capacity of the nanofluid above the IL glass transition temperature. The apparent density of MWCNT was determined by measuring densities of the nanofluids of different compositions. This quantity was found to be independent on concentration of MWCNT. The apparent density of 1.85 g×cm⁻³ remained the same for the nanofluids with different ILs.

[1] T. Fukushima, Science, 2003, 300, 2072.

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