Ionanofluids for Solar Energy Thermal Conversion

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Ionic liquids and nanomaterials are by far two of the most important developing areas of chemistry, especially in novel applications in chemical processing and new materials. The joint use of these areas in creating functionalized nanomaterials creates an excellent expectation in the new trends of technological chemistry. Several applications for thermal management have been presented, where SWCNT's or MWCNT's are dissolved or suspended in common solvents - nanofluids, to enhance the thermal conductivity of the media, namely liquids used in convective and boiling heat transfer[1-3]. In addition, it has been discovered that carbon nanotubes and room-temperature ionic liquids can be blended to form gels that may be used to make novel electronic devices, coating materials, and antistatic materials, namely dye-sensitized solar cells[4]. Aida and co-workers[5,6], prepared "bucky gel" stable materials by grinding suspensions of high-purity SWCNT's in imidazolinium cation-based ionic liquids and enhanced recently the possibilities of ionic liquids for design of soft materials based on CNT's.

In the present paper we report the development of new systems based on crystal violet and its functionalization of carbon nanotubes (MWCNT's) with the organic molecules suspended in ionic liquids (ionanofluids) to produce TISS (thickness insensitive spectrally selective) paint coatings for photothermal solar energy conversion. The spectral selectivity of the coatings was evaluated by the determination of the solar absorbance on the UV/Vis/NIR region and the thermal emmitance in the thermal infrared. It was verified that the addition of ionanofluids (bucky gels) increases the spectral selectivity of the paint base, improving the coating efficiencies. These studies show that these materials are promising for their application in low VOC coatings for solar collectors. Application to the conversion of solar energy in thermal energy is under way.

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