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Direct exfoliation of graphene in ionic liquids with aromatic groups¹ ROZANA BARI, GEORGE TAMAS, FAHMIDA IRIN, ADELIA AQUINO, EDWARD QUITEVIS, MICAH GREEN, Texas Tech University — The imidazolium cation of the designed and synthesized novel ionic liquids (ILs) having aromatic groups interact non-covalently with graphene. The Graphene stabilized by the IL is neither covalently functionalized nor requires the presence of additive stabilizer and such process results in dispersion of pristine graphene. This graphene dispersion is stable against centrifugation and the concentration of the resulting graphene is high as well. It was observed that the ILs are less effective in dispersing graphene if the cation does not have these aromatic groups. The interaction between the cation and the graphene surface plays an important role in the final yield of graphene. The graphene dispersion was characterized by Raman spectroscopy, X-ray Diffraction, and X-ray photoelectron spectroscopy. The experimental observations were compared with the density functional theory (DFT-D3) calculations and the comparison indicated that the experimental observations and the theoretical calculations were in good agreement. These validated theoretical calculations can further be used in future to design and synthesize the ILs in order to optimize the graphene yield without the need for additional experimentation.

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