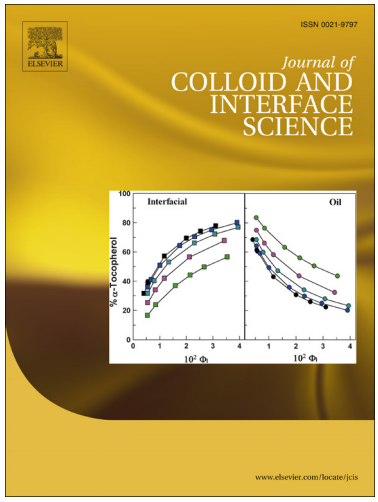

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High-performance lubricant additives based on modified graphene oxide by ionic liquids

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ABSTRACT

Graphene oxide (GO) is a layered material bearing a variety of oxygen–containing functional groups on its basal planes and edges, which allow it as a substrate to conduct a variety of chemical transformations. Here modified graphene oxide (MGO) was prepared using alkyl imidazolium ionic liquids (ILs) (1–butyl–3–methylimidazolium tetrafluoroborate (LB104), 1–butyl–3–methyl imidazolium hexafluorophosphate (LP104) and 1–hexyl–3–methylimidazolium bis(trifluoromethylsulfonyl) amide (LF106)) via epoxide ring–opening reaction, cation–π stacking or van der Waals interactions, with LB104 modified graphene (MG) exfoliated from graphite rod by a moderate electrochemical method as a comparison. The stability and tribological properties of MGO and MG as multialkylated cyclopentanes (MACs) additives were investigated in detail. The results show that GO is converted into graphene through the chemical modification using ILs, and MGO with good dispersion and stability in MACs significantly improves the tribological performance (friction and wear were reduced about 27% and 74% with pure MACs as a comparison, respectively). The excellent tribological properties are attributed to the

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