

PAPER

Black tea assisted exfoliation using a kitchen mixer allowing one-step production of graphene

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Abstract

A kitchen mixer is one of the possible tools for the exfoliation of graphene. While organic solvents such as NMP or DMF are suitable for the exfoliation of graphite, the majority are toxic and dangerously harmful when exposed to humans and the environment. Therefore, an alternative solvent must be proposed for green and sustainable production of graphene. In this initial work, we have developed a new synthesis method for graphene through the direct exfoliation of graphite in commercial black tea. We found that our maximum yield concentration of graphene is $Y = 0.032 \text{ mg ml}^{-1}$ after 15 min of mixing. From the data of Raman, the level of defects in our produced graphene is suggested as being very minor ($I_D/I_G = 0.17$), despite possible graphene functionalization by oxygen groups in tea. Incorporation of our graphene into PMMA results in shifting the onset temperature from 300 °C to 326 °C, which impressively validates the potential of the produced graphene as a thermal reinforcement material for polymer composites.