GRAPHENE DISPERSIONS IN DILUTED IONIC AND NON-IONIC SURFACTANT AQUEOUS SOLUTIONS

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Abstract

Graphene (G) was dispersed in surfactant solutions of different nature: cationic hexadecyltrimethylammonium bromide (CTAB) and dodecyltrimethylammonium bromide (DTAB),non-ionic polyoxyethylene-23-lauryl ether (Brij L23), and anionic sodium dodecylsulphate (SDS). The influence of the surfactant type, chain length and concentration, G concentration and G/surfactant weight ratio on the fluorescence of vitamin B_2 (riboflavin) was investigated (Fig. 1). The quality of the dispersions was assessed by scanning and transmission electron microscopies (SEM and TEM) (Fig. 2). A quenching phenomenon of the fluorescence of riboflavin was found for G dispersions in all the surfactants, which generally becomes stronger with increasing G/surfactant weight ratio. For dispersions in the ionic surfactants, the quenching is more pronounced as the surfactant concentration raises, whilst for the non-ionic one remains merely unchanged for the different G/Brij L23 weight ratios. More importantly, results indicate that DTAB solutions are the optimum media for dispersing G sheets, leading up to 16-fold drop in the fluorescence intensity. Understanding the mechanism in fluorescence quenching of G dispersions in surfactants could be useful for several optical applications. [1]

Figures

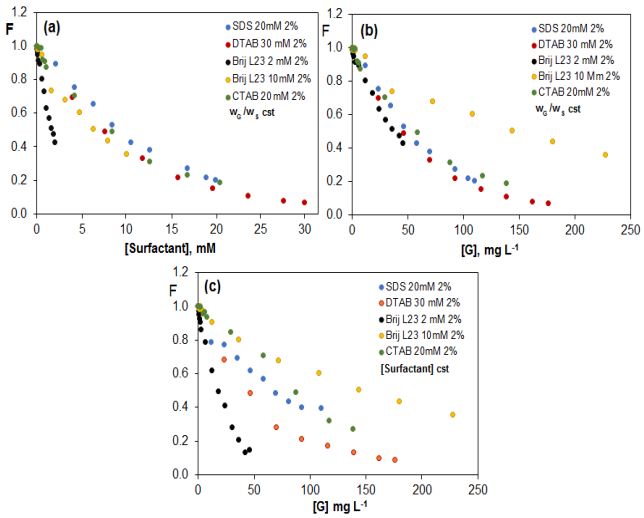

Figure 1: Fluorescence of vitamin B_2 in G 2.0 wt% dispersions in the surfactants vs. concentration of surfactants (a)and vs. G concentration for w_G/w_S =cst (b)and [surfactant]=cst (c)

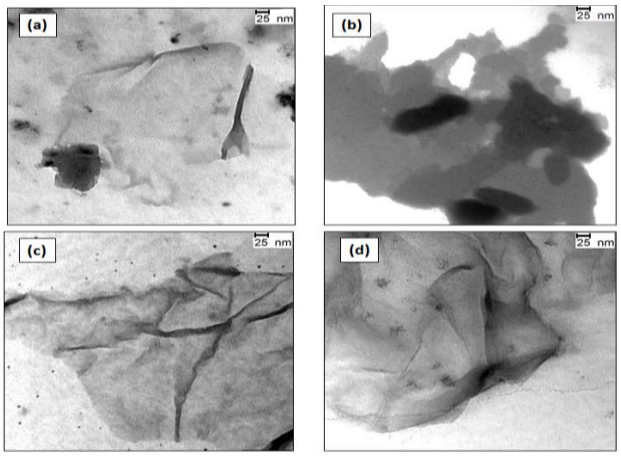

Figure 2: TEM images of G (2.0 wt%) dispersions in 20 mM SDS (a), 30 mM CTAB (b) and DTAB (c) as well as 10 mM Brij L23 (d)

References

[1] R. Mateos, S. Vera, M. Valiente M, A. M. Díez-Pascual, M.P. San Andrés MP, Nanomaterials, 7(2017) 403.