Synthesis and characterisation of functionalised-graphene oxide by gamma-ray irradiation

ABSTRACT

Gamma-ray irradiation technique was used to functionalise graphene oxide (GO) with various alkyl chain length alkylamine. Functionalisation of alkylchain onto the GO was confirmed by nuclear magnetic resonance (1H NMR), Fourier transform infrared (FTIR) and X-ray diffraction (XRD). FTIR of functionalised GO showed the appearance of significant peaks around 2850ï 2960 cmï 1 (ï CH2) which come from long alkylchain together with peak around 1450ï 1560 cmï 1 indicating the formation of Cï NHï C. XRD showed an additional diffraction peak at lower 2ɗ angle, indicating that the intercalation of alkylamine was successful. The effects of various alkyl lengths functionalised-GO on morphological and thermal properties were investigated. Scanning electron microscopy (SEM) analysis showed an increase in surface roughness when the alkyl chain length increases. The addition of alkylchain on GO surfaces significantly improves the thermal stability of GO, suggesting their great potential for hydrophobic material in industry.

Keyword: Graphene oxide; Functionalisation; Alkylamine; Gamma-irradiation