Influencing the interactions on poly(ethylene oxide) / graphite oxide nanocomposites

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Following the discovery of graphene and the demonstration of its properties by Konstantin Novoselov and Andrei Geim, [1] the scientific community is trying to utilize this promising material for industrial applications like hydrogen storage, solar cells and reinforcement of polymeric materials. In this work, we are investigating the effect of the interactions between a hydrophilic polymer, poly(ethylene oxide), PEO and graphite oxide, GO, on the dispersion of the additive and the final structure and properties of the nanocomposites. The attempt to influence the interactions is performed through varying the degree of oxidation and thus the hydrophilicity of GO. The Staudenmaier method is utilized to convert graphite to graphite oxide for varying oxidation times from 0.5 to 48 hours. The success of the oxidation is verified for most cases with X-ray diffraction, XRD, where a shift of the characteristic graphite diffraction peak towards lower angles is observed (Figure 1). Moreover, a quantitative measurement of the degree of oxidation is performed through X-ray photoelectron spectroscopy, XPS. The different GO's are utilized to synthesize PEO/GO nanocomposites. The structure of the nanohybrids is investigated with XRD, their thermal properties and stability with differential scanning calorimetry, DSC, and thermogravimetric analysis, TGA, respectively, whereas the effect of the GO on polymer conformation with infrared spectroscopy, ATR-FTIR.

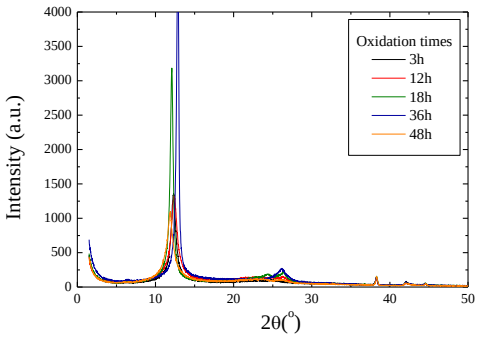

Figure 1: XRD measurements of GO with different oxidation times

References

[1] A. K. Geim and K. S. Novoselov, Nature Materials **6**, 183, (2007).

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