Fabrication and characterisation of Ion conductive polymer - graphene nanoplatelets composite thin films

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Abstract

Polymer-Graphene Nanoplatelets (P-GNPs) nanocomposite dispersion was synthesised using two different types of conductive polymers: cation and anion. The nanocomposite was utilized to fabricate thin films by two methods. The Langmuir-Schaefer (LS) technique has been used for the synthesis of ultra-thin films of the nanocomposite in different substrates such as Silicon oxide, glass, glassy carbon electrode and Indium tin oxide [1]. Brewster Angle Microscopy was utilised to investigate the Langmuir monolayer formation at the air-water interface. The commercial synthesis of thin films was analysed using the Layer by Layer method. The morphology and thickness of the films were studied using SEM, White Light Interferometer, Raman and optical microscopies. The films were used for the electrochemical detection of different analytes such us Vitamin C [2], Dopamine, Caffeine, Nitrites and THC (Tetrahydrocannabinol)[3].

References

[1] Bertoncello, P., Analytical Chemistry, 2007. 79(19): p. 7549-7553.

[2] B. Dinesh, R. Saraswathi, A.S. Kumar, Electrochimica Acta, (2017)

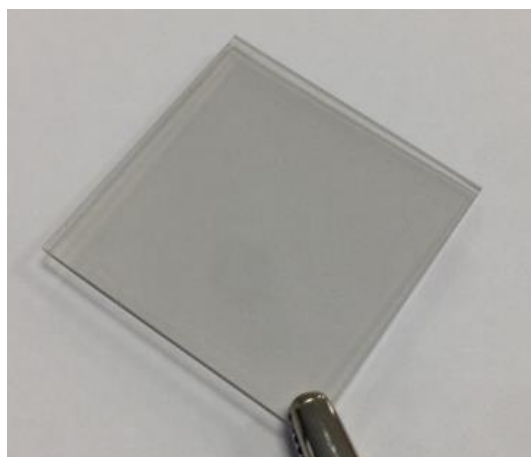[3] Marco A. Balbino, J Forensic Sci, 2016

Figures

Figure 1: *10 ultra-thin layers of Nafion- Graphene Nanoplatelets nanocomposite in Indium Tin Oxide (ITO) substrate; using the LS as a synthesis method.*

Figure 2: Different thickness of polymer graphene nanoplatelets films in glassy carbon electrode substrate (GCE). DI water has been dropped on the surface to prove the increase of the thickness using the Layer by Layer method. The inset photo corresponds to 2, 5, 10 and 20 layers of the nanocomposite, where the increase of the thickness is visual.