

# Synthesis and electrochemical applications of ionomer – graphite nanoplatelets thin films

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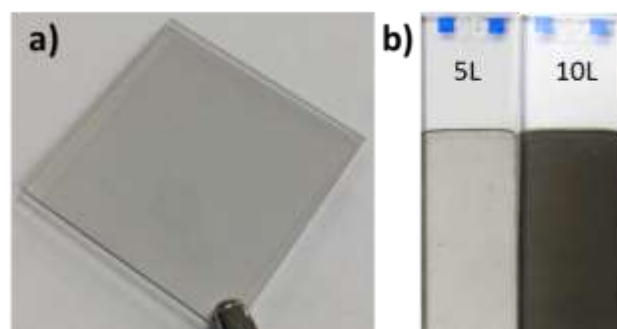
## Abstract

Nanocomposites were synthesised using cation and anion conductive ionomer (ionic conducting polymers). The thin films were fabricated by three methods: drop cast, Langmuir-Schaefer (LS) technique and Layer by layer (LbL) method [1]. The fabrication techniques were optimised resulting in very uniform ultra-thin films (less than 10nm). The morphology and thickness of the thin films were analysed using SEM, XPS, White Light Interferometer, Raman, profilometer and optical microscope. The electroanalytical and preconcentrating properties of the ionic conducting polymers were studied by several electrochemical techniques such as cyclic voltammetry and chronoamperometry. The results present good electrochemical detection of analytes: ascorbic acid (AA) [2], dopamine, nitrites and caffeine. The films were able to detect in a high range of concentration, even in the present of interferences, which make these films suitable for insitu detection. The amperometric detection of these analytes was successfully performed in real samples (orange juice, bacon and energy drinks) without any sample pretreatment or dilution, showing commercial interest.

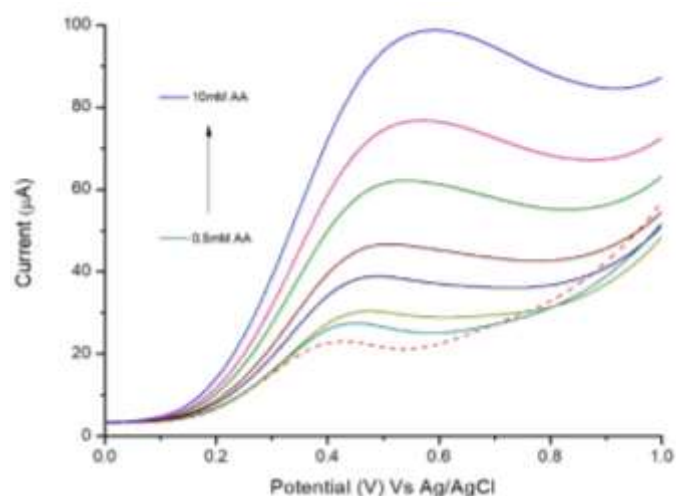
## References

- [1] Paolo Bertoncello et al., *Langmuir*, 25 (2006), 10380-10388
- [2] Sandra Hernandez-Aldave et al., *J. Mater. Chem. C*, 48 (2018), 13293-13304

## Figures



**Figure 1:** Cation - conductive ionomer nanocomposite films (Nafion- graphite nanoplatelets). a) 10 ultra-thin layers film using the LS as a synthesis method. b) 5 and 10 layers film using LbL synthesis method.



**Figure 2:** Cyclic voltammetry of commercial orange juice (dotted line) and after the addition of various concentration of AA from 0.5 to 10mM. The glassy carbon electrode was coated with anion – conductive ionomer nanocomposite (TPQPCI – graphite nanoplatelets) film. Supporting electrolyte 0.1M NaCl, scan rate, 50mV s<sup>-1</sup>