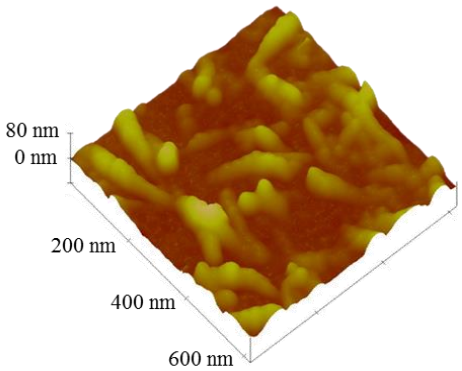
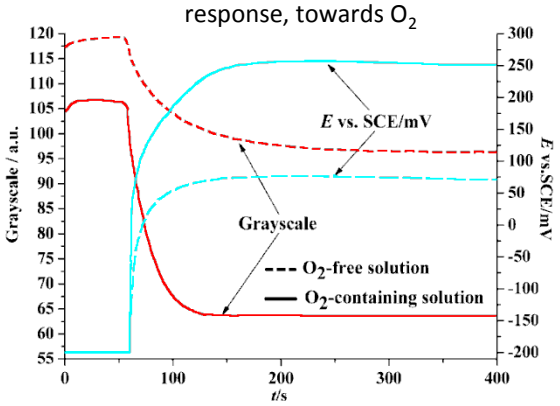
Organometallic/polymer matrices for highly sensitive dual electrochemical and optical assessment of Biochemical Oxygen Demand (BOD)



Dual sensor optical and electrochemical response, towards O_2



Improved potentiometric and optic sensitivity of polyaniline film to dissolved oxygen by incorporating iron-porphyrin, M. Li, I. M. Ornelas, W. Liu, Y. Niu, J.P.Correia, A. S. Viana, and G. Jin, Electroanal, 2015, 27, 1 – 10.

Electronically conducting polymers (or conducting plastics) are well known electrochromic materials. They undergo reversible colour modifications according with the electrical potential they are submitted. On the other hand, some metalloporphyrins like the iron-porphyrin - that we can find in hemoglobin – are very sensitive to the presence of oxygen, which induces redox transformations in the molecule. Incorporating the iron porphyrin into a polyaniline (conducting polymer) matrix, resulted in a high sensitive oxygen sensor. In a cooperative work of the Centre of Chemistry and Biochemistry from Ciências and the Chinese Academy of Sciences, a novel oxygen sensor for Biochemical Oxygen Demand assessment with dual transduction was developed. The interaction of the dissolved gas with the porphyrin provokes a spontaneous adjustment of the intrinsic electric potential of the polymer causing the modification of the optical properties of the material. In this way, both the electric signal and the optical response of the polymer reflect to the presence and amount of dissolved oxygen. The optical monitoring of the electrode is performed by TIRIE (Total Internal Reflection Imaging Ellipsometry) which is a technique highly sensitive to changes of the dielectric properties of the samples. The combined electrochemical and optical signals strongly corroborate each other, allowing the normalization of the readings in repetitive measurements using the same modified electrode.