Polymer-based fluorescent sensors for toxic heavy metals: a new, electrosynthesized benzene sulfonic acid-polypyrrole sensor for Cu(II) and Pb(II)

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Introduction

A number of polymers have been recently used as fluorescent sensors for the detection of heavy metal ions, yielding high sensitivity and selectivity[1-3]. In this lecture, after reviewing the literature, we have described the building and performances of a quenching-fluorimetric sensor, based on a new electrosynthesized, fluorescent benzene sulfonic acid-doped polypyrrole (BSA- PPy), for monitoring Cu(II) and Pb(II) traces in water.

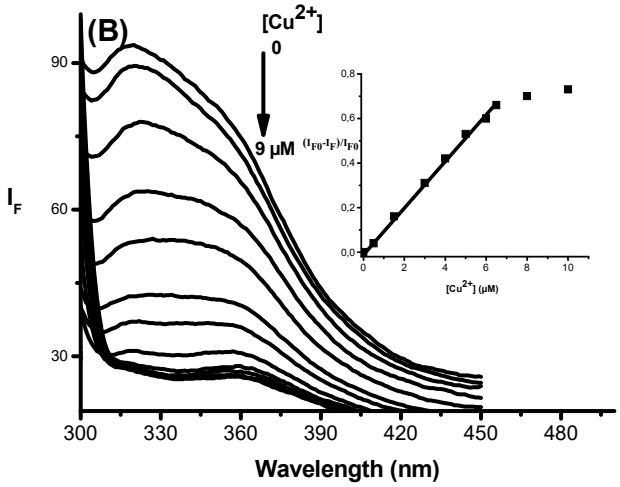
Materials and Methods

BSA-PPy films were electrosynthesized on flexible ITO in aqueous solution, and characterized by FT-IR spectrometry and XPS. BSA-PPy electronic absorption (Lambda Perkin-Elmer spectrometer) and fluorescence spectra (Kontron SFM-25 spectrofluorimeter) were recorded in DMSO at room temperature.

Results and Discussion

BSA-PPy fluorescence spectra were quenched upon increasing [Cu^{2+}] (Fig. 1). A linear Stern-Volmer relationship was obtained between the BSA-PPy fluorescence intensity and [Cu^{2+}] (0-7 µM - Insert), suggesting a dynamic fluorescence quenching process. The limit of detection values were very low (3.1 and 18.0 nM for Cu^{2+} and Pb^{2+}, respectively), indicating a high sensitivity for this quenching-fluorimetric sensor.

Figure 1: Effect of [Cu^{2+}] varying on the fluorescence emission spectra of BSA-PPy in aqueous solution.



Conclusion

The PPy-BSA quenching-fluorimetric sensor is very sensitive for Cu^{2+} and Pb^{2+}, and may be of great interest for the determination of heavy metal ions in environmental and biologic samples.

Bibliography

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