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Development of a biossensor for prostate cancer using sarcosine as biomarker

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Introduction: Prostate cancer is the most common type of tumor disease in men, making the development of new methods that allow an earlier detection extremely important. One of these methods concerns the use of biosensors to diagnose specific biomarkers for this type of cancer. Biomarkers could be amino acids, proteins or nucleic acids. In this work, the amino acid *sarcosine* was selected for biosensor development, making use of a molecularly-imprinted polymer (MIP) as biorecognition element. In healthy persons, sarcosine is not present or occurs in negligible concentrations in urine in heathy individuals, but individuals with prostate cancer are expected tohave higher concentrations of sarcosine. In turn, growing interest in the integration of MIP materials in biosensors has led researchers to design novel formats for electrochemical sensors. MIPs are a class of cross-linked polymers with specific recognition sites that are complimentary in shape, size and binding groups to the template.

Material and Methods: MIPs and control (non-imprinted polymers, NIPs) materials were developed in bulk, onto a carbon support (carbon black), by free radical polymerization, using acrylamide, *Bis*-acrylamide and vinylphosphonic acid as monomers. The absence/presence of radical initiators (APS and TEMED) were also evaluated.

The polymerized samples were analyzed by FTIR-ATR and RAMAN spectroscopy. The sarcosine rebinding on MIP are first analyzed using UV/Vis and chromatographic techniques. Finally, MIP materials will be inserted in a direct methanol fuel cell (DMFC), and calibrations with sarcosine will be performed.

Results and Conclusion: FTIR-ATR and Raman results evidenced that polymerization onto carbon black was successful. The use of radical initiators seemd to improve the polymerization, according the I_D/I_G ratio obtained by Raman spectroscopy studies. Detection conditions for sarcosine are currently being studied and optimized.

Key words: Prostate cancer, sarcosine, biomarkers, MIP