Advanced analytical techniques of drug detection

PhD. Student Preda Daniel

PhD. Advisor Prof. Dr. Ing. Gabriel-Lucian Radu

Starting from the importance and role of medicines in the current society, the consequences of excessive and inappropriate use both on the human body and their spread in the environment, are generated the perfect foundation for the development of new methods and analytical tools for detecting, quantifying and studying the various processes in which drugs are involved, as well as methods to combat pollution generated by their uncontrolled route. Among the multitude of classes of drugs, antibiotics and antithrombotics are noted due to the very high amounts used annually and environmental impact. It is noted the use of electrochemical analytical techniques for the detection/quantification of these classes of drugs because they are fast, financially available techniques with high possibilities of miniaturization and high sensitivity.

This doctoral thesis aims to develop electrochemical detection techniques based on unmodified and modified carbon electrodes with molecularly imprinted polymer films identifying drugs from the two classes mentioned above (antibiotics and antithrombotics) from various matrices. In this regard a voltametric method of oxytetracycline detection was developed based on a disposable pencil mine electrode and also two sensors were constructed based on molecularly imprinted polymer films, which use natural phenolic compounds (caffeic acid and curcumin) as monomers for the detection of dipyridamole. At the same time, the enzymatic degradation of dipyridamole in the presence of lacase, using caffeic acid as a mediator, has been studied in order to develop a method of removing this drug from wastewater.