

FACULTY DEVELOPMENT ENDOWMENT FUNDS

Faculty Research Fund

Award Date: Fall 2023

Proposal Title: Using a Disposable Sensor to Detect the Concentration of Selective Serotonin Reuptake Inhibitors (SSRIs) in Tap Water

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ABSTRACT

While SSRIs are designed for human consumption and have undergone extensive safety testing in humans, their presence in aquatic environments can lead to various ecological concerns. These include impacts on aquatic life, bioaccumulation, ecological disruptions, potential human health concerns, and the need for continuous environmental monitoring. Proper disposal of pharmaceuticals and improved wastewater treatment practices are essential steps in mitigating the presence of SSRIs and other pharmaceuticals in water sources. A disposable sensor designed to detect SSRIs is a valuable tool for environmental monitoring and research. Such a sensor can be instrumental in assessing the presence and concentration of these pharmaceuticals in water sources, helping to identify potential environmental risks and contamination.

In our research, we are focused on detecting SSRIs like fluoxetine (Prozac®), citalopram (Celexa®), and sertraline (Zoloft®) in tap water. To achieve this, we will employ electrochemical techniques using screen-printed electrodes (SPEs) to develop an affordable, eco-friendly, and disposable sensor for SSRIs. SPEs have gained popularity in electrochemical sensing due to their versatility, portability, and cost-effectiveness. To enhance the sensor's performance, we have modified the screen-printed carbon electrodes by depositing a conductive polymer layer known as 3,4-ethylenedioxythiophene (PEDOT) and applying a plasticized poly (vinyl chloride) (PVC) membrane coating. This PVC/PEDOT modified electrode operates in the stripping voltammetric mode, demonstrating a linear current response when detecting fluoxetine, sertraline, and citalopram in both tap and waste water samples.

Significantly, our measurements conducted with the membrane-coated electrode have provided insights into the lipophilicity of these antidepressants. This information contributes to a better understanding of their environmental toxicity and the potential risks they pose to humans."