Director de tesis: Dr. Eden Morales Narváez

Sinodales: Dr. Mario Alejandro Rodríguez Rivera
(Sinodal Interno, Secretario)

Dra. Valeria Piazza
(Sinodal Interna, Vocal)

Dr. Eduardo de Jesús Coutiño González
(Sinodal Interno, Presidente del Jurado)

Tesis: "REDUCTION OF GRAPHENE OXIDE AND ITS IMPACT ON THE PERFORMANCE OF A BIOSENSING SYSTEM"

Resumen:

Graphene oxide (GO) has aroused the interest of the scientific community due to its extraordinary properties and potential applications; for example, in biosensors, which are analytical devices that can detect the presence of target molecules with high specificity and sensitivity. Particularly, GO has been demonstrated to be an excellent photoluminescence quencher, this property is very useful in the development of biosensing systems based on fluorescence resonance energy transfer (FRET). Additionally, it has been reported that the effect of fluorescence quenching is more efficient when GO is reduced. This effect could be directly used to enhance the analytical performance of a FRET–based biosensing system. In the present thesis, the effects generated in the analytical performance of a biosensing platform due to the reduction of GO in three different samples are reported. This study was divided into several stages, the first one consisted of making GO adhesion tests on the surface of tissue culture treated (TCT) microplates, this in order to know the approximate amount of GO that adheres to the surface after stages of washing with ultrapure water, the results of this stage reveals that around 5 % of the concentration of GO used to cover the TCT microplates surface remains on it after the washing stages. This information is relevant to the next stage, because the amount of reducing agent, L-ascorbic acid (L-AA) will depend on this, since the suggested amounts of L-AA correspond to 1.75 and 3.5 times the concentration of GO (1.75x [GO] and 3.5x [GO]). Once the reduction process was performed on GO, photoluminescence quenching studies were performed, and these studies indicated that, effectively, the reduction process generated changes in quenching values (ratio between final and initial intensity, I0/If) from 0.32 to 0.40, and the photoluminescence quenching saturation time from 32 to 25.68 minutes for GO and rGO respectively. Additionally, the samples 4.1 GO and 4.1 rGO, displayed better adhesion and so enhance their abilities as a fluorescence quencher when high binding surface microplate surface was employed. The changes of fluorescence quenching values were 0.74 and 0.40, 0.71 and 0.38 for 4.1GO and 4.1rGO samples, respectively. In 5.1 case the fluorescence quenching values were 0.68 and 0.39, 0.69 and 0.37 for 5.1 GO and rGO respectively. Nowadays, biosensors have become indispensable tools for many fields, so it is necessary to have reliable and efficient devices. This work is highly relevant since the results presented here represent a first advance to establish parameters that contribute to improving the analytical performance of a biosensing platform, generating increasingly efficient devices in terms of sensitivity and assay time.