**PCA statistical method for classification of HIV HCV sensors**

**ARTICLE INFO**

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**ABSTRACT:** Many of the global population suffer from infectious diseases, so studies in the health area aimed at identifying these diseases are critical. Some diseases have a long immunological window, where antibodies take a long time to be identified. A possible identification and classification method uses the statistical analysis performed by the PCA (Principal-Components-Analysis), that reduce the number of variables to identify the presence of antibodies. This article aims to classify immunosensors according to the antibody, analyzing their responses in relation to impedance and frequency using the PCA statistical method. It was adopted Jupyter Notebook, Python, Pandas and Scikit-learn. The study was based on data collected from two immunosensors, HCV sensor and HIV sensor, analyzing their response as a function of antibody concentration. It was possible to identify the dependence of the response of both sensors with the adopted immobilization matrix. The PCA analysis for the selected datasets showed a relevant classification using PC1, PC2 and PC3 and it was possible to identify which variables impacted each Principal Component (PC) the most.

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**INDICATION OF REVIEWERS**

We kindly ask the authors to suggest **five** suitable reviewers, providing full name, affiliation, and email.

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**OTHER INFORMATION**

1. A considerable amount of literature has been published on electrochemical sensors. In particular, immunosensors that allow us to identify different diseases have attracted much attention. This article aims to classify immunosensors according to the antibody, analyzing their responses in relation to impedance and frequency using the PCA statistical method. The study was based on data collected from two immunosensors, HCV sensor and HIV sensor, analyzing their response as a function of antibody concentration. It was possible to identify the dependence of the response of both sensors with the adopted immobilization matrix. We believe that our work should be submitted for publication since it fits within the scope of the Journal for the reasons pointed out above.
2. This manuscript is original; it is not being submitted for publication elsewhere and is not under consideration for publication elsewhere.
3. The authors have approved and taken full responsibility for its contents, and there is no conflict of interest.

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**DATA AVAILABILITY STATEMENT**

Data will be available upon request.