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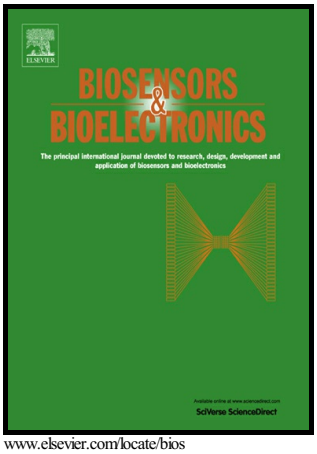

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Ultrasensitive Direct Impedimetric Immunosensor for Detection of Serum HER2

Shikha Sharma[1†], Julia Zapatero-Rodríguez[1,2†], Rahul Saxena[3†], Richard O'Kennedy[1,2†] and Sudha Srivastava[3†*]

[1] Biomedical Diagnostics Institute (BDI) , Dublin City University, Dublin 9, Ireland.

[2] School of Biotechnology, Dublin City University, Dublin 9, Ireland.

[3] Department of Biotechnology, Jaypee Institute of Information Technology, Noida, UP- 201307 India.

[†]All authors contributed equally to this work.

*Corresponding author. Tel.: +911202400973; fax: +911202400986. E-mail address: sudha.srivastava@jiit.ac.in

Abstract

Assesment of human epidermal growth factor receptor 2 status is a key factor prompting definitive treatment decisions that help in reducing mortality rates associated with breast cancer. In this article, highly sensitive and low-cost impedimetric immunosensor using single-chain fragment variable antibody fragments was developed for quantitative detection of human epidermal growth factor receptor 2 from serum employing gold nanoparticle-modified disposable screen-printed carbon electrodes. The gold nanoparticles facilitate fast electron transfer and offer a biocompatible surface for immobilization of small antibody fragments in an oriented manner, resulting in improved antigen binding efficiency. The single-chain fragment variable antibody fragment-modified screen printed immunosensor exhibits wide dynamic range of 0.01–100 ng mL^{-1} and detection limit of 0.01 ng mL^{-1} . The advantages offered by this platform in terms of high sensitivity, broad dynamic range and low-cost demonstrates great potential for improved monitoring of human epidermal growth factor receptor 2 levels for the management of breast and other cancers.

Keywords: Breast cancer; Epidermal growth factor receptor 2 (HER2); Electrochemical; Immunosensor; Recombinant scFv antibodies.