

*Short Communication*

## **QCM biosensor for Prostate Specific Antigen assay using antibody – gold particle conjugate**

*Miroslav Pohanka*

Faculty of Military Health Sciences, University of Defence, Trebesska 1575, CZ-500 01 Hradec Kralove, Czech Republic

E-mail: [miroslav.pohanka@gmail.com](mailto:miroslav.pohanka@gmail.com)

doi: 10.20964/2021.05.04

*Received:* 9 November 2020 / *Accepted:* 22 December 2020 / *Published:* 31 March 2021

---

Prostate Specific Antigen (PSA) is a key marker for prostate cancer screening by standard laboratory tests based on blood, plasma or serum analysis. The current laboratory methods for PSA level determination are based on various chromatographic, immunochemical and other instrumental analyses that has to be done in the specialized laboratories. Experiments in this work are focused on construction of a Quartz Crystal Microbalance (QCM) biosensor as a simple device suitable for point-of-care diagnosis based on PSA concentration determination in body fluids. The QCM sensors were covered with antibody against PSA and gold nanoparticles modified with specific antibody against PSA were prepared in a separate step. Change in oscillation frequency was measured as the immunocomplexes QCM biosensor – PSA – modified gold nanoparticles were formed. Calibrating for standard solution of PSA, limit of detection equal to 0.054 µg/l and limit of quantification equal to 0.18 µg/l were figured. The biosensor was not sensitive to interference of other plasma proteins or to matrix effect and fully correlated with the Enzyme-Linked Immunosorbent Assay (ELISA) as a standard method. In a conclusion, the biosensor appears to be a simple and reliable tool that can be used in standard laboratory and point-of-care testing.

---

**Keywords:** affinity; antibody; cancer; biosensor; gold nanoparticles; immunosensor; marker; piezoelectric; point-of-care; prostate specific antigen; quartz crystal microbalance

[FULL TEXT](#)

© 2021 The Authors. Published by ESG ([www.electrochemsci.org](http://www.electrochemsci.org)). This article is an open access article distributed under the terms and conditions of the Creative Commons Attribution license (<http://creativecommons.org/licenses/by/4.0/>).