

Abstract

Miniaturized Immunoplatforms Supporting the Diagnosis of Lung Cancer Biomarkers and Immunotherapies [†]

Marcin Drozd ^{1,2,*} , Polina Ivanova ^{1,2,3}, Sylwia Karoń ^{1,2}, Adrian Duszczczyk ^{1,2} , Katarzyna Tokarska ² and Elżbieta Malinowska ^{1,2}

- ¹ Chair of Medical Biotechnology, Faculty of Chemistry, Warsaw University of Technology, Noakowskiego 3, 00-664 Warsaw, Poland
- ² Centre for Advanced Materials and Technologies CEZAMAT, Warsaw University of Technology, Poleczki 19, 02-822 Warsaw, Poland
- ³ Section of Inorganic and Analytical Chemistry, Faculty of Chemistry, University of Warsaw, 02-093 Warsaw, Poland
- * Correspondence: m.drozd@cezamat.eu
- [†] Presented at the 9th International Symposium on Sensor Science, Warsaw, Poland, 20–22 June 2022.

Abstract: Immunotherapy is an innovative cancer treatment that activates the immune system, enabling natural anti-cancer defense mechanisms. Although the large-scale use of immunological treatment is yet to happen, immunotherapy already plays a practical role in cancer treatment. Lung cancers have been selected as the main subject of interest. The aim of the presented research is to explore an innovative methodology for the rapid determination of protein antigens by means of miniaturized immunosensing platforms. One of the key elements of such a diagnostic approach is the determination of programmed death-ligand 1 (PDL1) and/or human epidermal growth factor receptor (HER2) expression directly on cancer cells or in biofluid samples. As a principle, the developed method should act as a support or an alternative to the assessment of tissue sections after immunohistochemical staining or classical enzyme-linked immunosorbent assays (ELISAs). The idea covers the utilization of biosensing platforms based on flexible substrates, e.g., poly (ethylene terephthalate) foils or antibody-binding membranes made of nitrocellulose/poly (vinylidene fluoride) for the sensitive detection of lung cancer biomarkers. As a result, it would be possible to globally assess the occurrence of biomarkers (e.g., PDL1 epitopes). The detection process consists of instrumental readout using optical techniques (spectrophotometry or fluorometry). The main goals of the presented research will be: (i) the characterization of antibody-protein antigen interactions and the selection of the best immunosensing formats; (ii) the selection of the most attractive epitopes as sensing targets; and (iii) the characterization of the analytical performance of the developed immunosensing platforms for the detection of PDL1 and/or HER2 biomarkers. Taking into account the benefits, we believe that the proposed research will allow us to broaden the knowledge about cancer diagnostics and allow us to propose a quantitative methodology for determining various epitopes of cancer cells.

Keywords: immunosensing; cancer biomarkers; PDL1; HER2; immunoassay; miniaturization



Citation: Drozd, M.; Ivanova, P.; Karoń, S.; Duszczczyk, A.; Tokarska, K.; Malinowska, E. Miniaturized Immunoplatforms Supporting the Diagnosis of Lung Cancer Biomarkers and Immunotherapies. *Eng. Proc.* **2022**, *21*, 23. <https://doi.org/10.3390/engproc2022021023>

Academic Editors: Piotr Lesiak, Tomasz Woliński and Leszek Jaroszewicz

Published: 25 August 2022

Publisher's Note: MDPI stays neutral with regard to jurisdictional claims in published maps and institutional affiliations.



Copyright: © 2022 by the authors. Licensee MDPI, Basel, Switzerland. This article is an open access article distributed under the terms and conditions of the Creative Commons Attribution (CC BY) license (<https://creativecommons.org/licenses/by/4.0/>).

Author Contributions: Conceptualization, M.D.; methodology, M.D., P.I., S.K., A.D. and K.T.; formal analysis, M.D. and E.M.; investigation, M.D., P.I., S.K., A.D. and K.T.; resources, M.D., P.I., S.K., A.D., K.T. and E.M.; writing—original draft preparation, M.D.; writing—review and editing, M.D.; visualization, M.D.; supervision, E.M.; project administration, M.D.; funding acquisition, M.D. and E.M. All authors have read and agreed to the published version of the manuscript.

Funding: This research was funded by Warsaw University of Technology within Excellence Initiative—Research University program called BIOTECHMED-1 (POB Research Center: Biotechnology and Biomedical Engineering), grant number 504/04496/2530/45.010400.

Institutional Review Board Statement: Not applicable.

Informed Consent Statement: Not applicable.

Conflicts of Interest: The authors declare no conflict of interest.