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Abstract

Molecularly Imprinted Polymer Based Capacitive Chemosensor for Determination of Heterocyclic Aromatic Amines in Food Samples †

Viknasvarri Ayerdurai [1], Maciej Cieplak [1,*], Alvaro Garcia-Cruz [1], Joanna Piechowska [1], Krzysztof R. Noworyta [1], Agnieszka Pietrzyk-Le [1], Francis D'Souza [2], Wlodzimierz Kutner [1,3] and Piyush Sindhu Sharma [1]

[1] Institute of Physical Chemistry, Polish Academy of Sciences (IPC PAS), Kasprzaka 44/52, 01-224 Warsaw, Poland
[2] Department of Chemistry, University of North Texas, 1155 Union Circle, #305070, Denton, TX 76203-5017, USA
[3] Faculty of Mathematics and Natural Sciences, School of Sciences, Cardinal Stefan Wyszynski University in Warsaw, Woycickiego 1/3, 01-815 Warsaw, Poland
* Correspondence: mcieplak@ichf.edu.pl
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Abstract: Quinoxaline heterocyclic aromatic amines (HAAs) are formed during meat and fish cooking, frying, or grilling at high temperatures. They are usually generated at very low concentrations (~ng per g of a food sample). However, HAAs are classified as potent hazardous carcinogens because they may effectively damage DNA because of intercalation or strand break. Hence, chronic exposure to HAAs, even in low doses, can lead to lung, stomach, and breast cancer. HPLC is commonly applied for HAA toxins' determination in food matrices. However, this technique is expensive, tedious, and time-consuming. Therefore, fast, simple, inexpensive, and reliable HAA determination procedures are in demand. Molecularly imprinted polymers (MIPs) are excellent examples of bio-mimicking recognition materials. Therefore, they have been used in numerous applications in selective chemosensing. Within the present research, we synthesized a nucleobase-functionalized molecularly imprinted polymer (MIP) to be used as a recognition unit for an electrochemical sensor to selectively determine 2-amino-3,7,8-trimethyl-3*H*-imidazo[4,5-*f*]quinoxaline (**7,8-DiMeIQx**) HAA. **MIP-(7,8-DiMeIQx)** film-coated electrodes were highly sensitive and selective to **7, 8-DiMeIQx**. The linear dynamic concentration range of the devised capacitive chemosensor extended from 47 to 400 µM of **7, 8-DiMeIQx**, and the imprinting factor was high (*IF* = 8.5). The **MIP-(7,8-DiMeIQx)** film-coated electrodes were successfully applied for **7, 8-DiMeIQx** determination in meat samples.

Keywords: heterocyclic aromatic amine; quinoxaline; impedimetric chemosensor; molecularly imprinted polymer; nucleobase bithiophene derivative; intercalation; allosteric recognition; molecular recognition; bio-mimicking material

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