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Quantum Dots-Based Competitive Assay for the Recognition of Nucleotides †

Klaudia Głowacz *, Marta Domańska and Patrycja Ciosek-Skibińska *

Chair of Medical Biotechnology, Faculty of Chemistry, Warsaw University of Technology, Noakowskiego 3, 00-664 Warsaw, Poland; marta.domanska2.stud@pw.edu.pl

* Correspondence: kglowacz@ch.pw.edu.pl (K.G.); pciosek@ch.pw.edu.pl (P.C.-S.)

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Abstract: Quantum dots (QDs) are colloidal, semiconductor nanocrystals with a diameter in the range of 1–20 nanometres, distinguished by unique physicochemical properties, which are partly the result of the extremely high surface-to-volume ratio and the quantum confinement effect. Due to their extraordinary optical properties, not only have they become an alternative to the commonly used molecular probes in biomedical applications, but they are also extensively studied nanomaterials for the development of sensing systems in analytical chemistry. Therefore, over the last few years quantum dots were employed in sensing systems representing many different detection schemes [1]. One of the promising sensing approach in which QDs can be implemented are Indicator Displacement Assays (IDA), where competitive interactions between sensing system elements are usually utilized. In this work, a simple, quantum dots-based competitive assay for the recognition of nucleotides (AMP, ATP, CMP, CTP, UMP, UTP) is presented. The developed assay was constructed using single, thiomalic acid (TMA) capped CdTe quantum dots combined with nickel ions. The introduction of nucleotides into the sensing system resulted in subtle changes in fluorescent properties observed utilizing Excitation-Emission Matrix fluorescence spectroscopy. The obtained Excitation-Emission Matrixes (EEMs) were then used as characteristic, fluorescent fingerprints and processed by means of chemometric tools for nucleotides recognition. The presented results are a solid foundation for the development of a simple Indicator Displacement Assay (IDA) sensor array, which may serve as a tool for the identification and quantification of nucleotides in the future.

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References

1. Chern, M.; Kays, J.C.; Bhuckory, S.; Dennis, A.M. Sensing with photoluminescent semiconductor quantum dots. *Methods Appl. Fluoresc.* **2019**, *7*, 012005.