

Electrochemical Studies of Branched Carbazole Monomers and their Polymer Films – towards application for the Molecularly Imprinted Polymers

Julia Owczarska^{1,†}, Renata Rybakiewicz-Sekita,² Roman Gańczarczyk,³ Agnieszka Powała,⁴ Teresa Żolek,⁴ Krzysztof Noworyta,^{1,*}

¹Institute of Physical Chemistry, Polish Academy of Sciences, Kasprzaka 44/52, 01-224, Warsaw, Poland

²Institute of Mathematics, Faculty of Science and Mathematics, Cardinal Stefan Wyszyński University in Warsaw, Kazimierza Wóycickiego 1/3, 01-938 Warsaw, Poland

³Warsaw University of Technology, Faculty of Chemistry, Noakowskiego 3, 00-664 Warsaw, Poland

⁴Department of Organic and Physical Chemistry, Faculty of Pharmacy, Medical University of Warsaw, Banacha 1, 02-097 Warsaw, Poland

† corresponding author's email: jowczarska@ichf.edu.pl

Electrochemical studies on three selected branched carbazole monomers with cross-linking properties, as well as their polymer films, were conducted in order to assess their potential application in the synthesis of molecularly imprinted polymers (MIPs) [1]. The studied structures differ in the number of phenyl rings and the presence or absence of thiophene substituents, which are expected to influence the polymerization process, as well as properties of the resulting polymer films. The primary objective was to evaluate the electroactivity of both the monomers and the polymer layers electrochemically deposited on electrode surfaces and to investigate how structural variations between the monomers affect the electrochemical behaviour and morphology of their corresponding polymers.

The polymer films were electrodeposited under potentiodynamic conditions and their electrochemical behavior of the monomers was analysed. Subsequently, the fabricated polymer films were subjected to detailed electrochemical characterization. Special attention was given to the reversibility and character of redox processes occurring within the polymer layers.

The morphology of the deposited films was investigated using scanning electron microscopy (SEM), which enabled the assessment of layer uniformity and the identification of structural differences between the polymers prepared from various monomers. Furthermore, spectral characterization of the polymer films was performed in order to gain insight in the film composition and electronic properties. To gain deeper insight into the polymerization mechanism, density functional theory (DFT) calculations of the monomers and their cation radicals were performed. These computational studies provided information on the geometric and electronic structures of the monomers and their influence on the resulting polymer properties.

The results lay the groundwork for further studies on employing these monomers in the synthesis of MIPs selective toward antiviral drugs intended for use as recognition layers in chemosensors for the detection of pharmaceuticals in human body fluid samples.

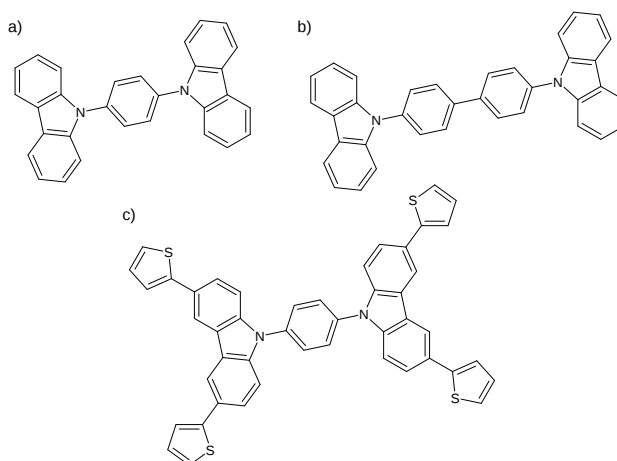


Figure 1: Investigated cross-linking structures:
a) Carb-Phe-Carb, b) Carb-Phe-Phe-Carb, c) Th-Carb-Phe-Carb-Th.

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References

- [1] Gajda M. et al., *Biosens Bioelectron*, **169**, 112589 (2020)