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PISANI KONCEPTI I UMJETNIČKI RADOVI STUDENATA

WRITTEN CONCEPTS AND STUDENTS 'ART WORKS

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Synthesis of Amino Acid-Functionalized Carbon Quantum Dots from *Citrus clementina* Peel: Investigating the Antiradical Activity and Selectivity of Metal Ion Detection

Monika Kovačević¹, Kristina Jandel¹, Silvija Šafranko^{2*}, Anamarija Stanković¹, Stela Jokić²

¹ Josip Juraj Strossmayer University of Osijek, Department of Chemistry, Ulica cara Hadrijana 8/A, Osijek, Croatia

² Josip Juraj Strossmayer University of Osijek, Faculty of Food Technology Osijek, Franje Kuhača 18, Osijek, Croatia

*Corresponding author: silvija.safranko@ptfos.hr

Abstract: Carbon quantum dots as fluorescent nanoprobes have recently attracted tremendous attention due to their remarkable properties regarding chemical stability, biocompatibility/low toxicity, water solubility, and optical efficiency. In this study, N-doped carbon quantum dots from *Citrus clementina* peel and five different amino acids (Leu, Trp, Arg, Ala, His) have been prepared, and differences between the chemical, structural and biological properties have been studied. The nitrogen incorporation into the biomass-derived carbon quantum dots (CQDs) led to the increase in the quantum yield and to the improvement in performance and sensitivity of nanoprobes in general, compared to the blank system (without the addition of amino acids). The prepared N-doped CQDs exhibited good stability in aqueous media, and showed similar optical properties, while differences were observed regarding the biological activity and selectivity in metal ion detection. The samples CQD@Leu and CQD@Arg exhibited the highest antiradical activity by DPPH scavenging radical method of $99.48 \pm 0.13\%$ and $99.48 \pm 0.46\%$, respectively. Furthermore, in order to evaluate selectivity and interference effects in ion sensing and detection using N-doped CQDs, different ions were tested, including Ca^{2+} , Cu^{2+} , Fe^{3+} , K^+ , Hg^{2+} , Mg^{2+} , Al^{3+} , Mn^{2+} , and Na^+ . This study may represent an innovative approach to the efficient utilization of waste for practical applications, including those in analytical chemistry and food technology.

Keywords: citrus waste, fluorescent nanomaterials, antioxidant activity, metal ion detection

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