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MARCH 28–31, 2023

HOTEL LONE • ROVINJ

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BOOK OF ABSTRACTS

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6th Symposium Vladimir Prelog

Book of Abstracts

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Quantum yield optimization of hybrid carbon quantum dots and their application as sensing nanomaterial

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Carbon quantum dots (CQDs), a new type of zero-dimensional carbon-based nanomaterials, represent an emerging class of fluorescent materials for potential applications in biosensing, chemical sensing, and theranostics. Moreover, CQDs have attracted an enormous attention due to their outstanding physico-chemical and tunable optical properties, water dispersibility, high photostability and biocompatibility. In this study, hybrid carbon quantum dots (CQDs@hybrid) have been prepared by a hydrothermal process and the quantum yield was optimized using response surface methodology (RSM). The process was analyzed and optimized using a central composite face-centered design (CCFD) model in a quadratic function consisting of 11 experimental runs with three replicates at the central point. The effects of temperature (160-200 °C; X_1), and preparation time (6-12 h; X_2) were investigated on the quantum yield (*y*) obtained by CQDs@hybrid sample. The CQDs@hybrid sample obtained under optimal conditions exhibited a high quantum yield of 17.52±0.59%, and was studied in details regarding chemical (solubility, EDS), physical (AFM, FTIR, PXRD), and optical (spectrofluorimetry, UV-Vis spectroscopy) properties. Furthermore, the sample CQDs@hybrid were applied as fluorescent nanoprobe toward Fe^{3+} ion detection in model systems, and also for the detection of Fe^{3+} ions in real samples of well-water, herbs and spices. The presented results indicate a good preparative approach for obtaining highly fluorescent CQDs which have great potential for water monitoring, food analysis and quality control studies.

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