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Sensors based on biomimetic porphyrin derivatives & their hybrid combinations with photonic nanoparticles

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Most synthetic porphyrins are hydrophobic π -conjugated macrocycles and as a consequence organic building blocks for supramolecular chemistry, providing in this way the required optoelectronic and morphological properties for a plethora of novel sensors. Besides, porphyrins possess huge capacity for chemical modifications by peripheral substitution and by using them in hybrid combination with photonic, electronic and magnetic compounds. Wide band absorption hybrid materials were prepared from different A_3B porphyrins and cobalt, manganese and zinc metalloporphyrins and silver or gold nanoparticles with the purpose to develop optical and electrochemical detection of hydrogen peroxide or other compounds showing potential in early medical diagnosis. The synthesized materials were characterized by UV-vis, fluorescence, FT-IR, AFM, SEM TEM and CV. STEM investigation of the porphyrin-gold hybrids revealed some dendritic structures produced mainly by porphyrin H- and J-type helicoidal self-aggregation due to their interaction with gold nanoparticles. Layer-by-layer assembly of gold colloid nanoparticles and cobalt porphyrins on GC electrodes generated electroactive thin films capable to electrochemically detect minute quantities of H_2O_2 that are relevant for early diagnosis in medicine. The Co-porphyrin-gold hybrid was exposed to increased amounts of H_2O_2 and the changes of the absorption spectra were monitored by UV-vis spectroscopy, proving the same quality of sensing capacity.

Biography

Eugenia Fagadar-Cosma has completed her PhD in 1997 at Polytechnical University of Timisoara. She is senior scientist, doctoral advisor and coordinator of Organic Chemistry –Porphyrin Programmes in Institute of Chemistry Timisoara of Romanian Academy. She has published more than 250 peer-reviewed full-papers, 93 papers in prestigious ISI journals, 8 books and 2 chapters in international volumes, 7 patents and has been serving as an editor to a special issue (Bentham). She was involved in managing of many FP6, FP7 and national granted projects. She is reviewer of more than 20 ISI indexed ELSEVIER, SPRINGER and ACS Journals.

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