BOOK OF ABSTRACTS

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FORMATION OF GOLD NANOSTRUCTURES MEDIATED BY A NEW FLUORINATED STATISTICAL COPOLYMER

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Gold nanoparticles (AuNPs) possessing surface plasmon can be formed by green-chemistry pathways, e.g. using tyrosine as a reducing agent. The presence of a new fluorinated statistical copolymer (FSC) can mediate AuNPs formation under basic environments. Indeed, water-soluble fluorinated polymers have recently emerged, opening a prospective pathway for enhanced imaging based on ^{19}F-MRI (magnetic resonance imaging) [1]. By varying ratios of hydrophilic and fluorinated monomers, the water-solubility of FSC can be adjusted. Moreover, the FSC can be ended by different types of groups containing sulphur to enable efficient conjugation with Au nanostructures (AuNSs). AuNSs can thus represent another imaging modality, optical one, of the prepared nanomaterial serving then as a bimodal imaging tracer which is our aim. Based on the reaction conditions, especially the order of reactants while keeping their molar ratios the same, either plasmonic AuNPs and/or non-plasmonic AuNSs can be formed as revealed in the present study. For the characterization of the as-prepared systems, several spectroscopic and microscopic methods were used: UV-Vis spectroscopy, dynamic light scattering, zeta potential measurements, steady-state fluorescence spectroscopy, Raman spectroscopy, infrared absorption spectroscopy, and transmission electron microscopy (TEM). Based on the results, it can be summarized that fluorescent AuNSs exhibited an emission band with the maximum located at approximately 600 nm when UV excited (280 nm); while plasmonic AuNPs showed an extinction band maximum positioned in the range of approx. 516-530 nm. It was assumed that these AuNPs would be suitable for surface-enhanced Raman spectroscopy, but it was not the case. Nevertheless, the formation of AuNPs was also confirmed by TEM imaging. Instead of SERS-active substrates, the as-prepared plasmonic AuNPs manifested themselves by luminescent features in the near-infrared region (850-950 nm) when 785 nm excitation laser line used. Therefore, they could be exploited as luminescent probes.

References

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