Design and development of nanoparticulate complexes for near-infrared fluorescence imaging and thermotherapy

Marta Gordel-Wójcik#

Faculty of Chemistry, University of Wrocław, 14.p F. Joliot-Curie Street, 50-383, Wrocław, Poland

This work presents a study of the nonlinear optical properties of silver sulfide quantum dots modified with different surface ligands, including mercaptopropionic acid [1], glutathione (GSH, γ-L-glutamyl-L-cysteinylglycine), tiopronin, and chiral ligands based on penicillamine enantiomers[2]. The influence of ligand type on the optical response of the nanostructures is discussed. The formation of hybrid materials composed of silica, gold, silver sulfide quantum dots, and organic molecules is also described.[3,4] Particular emphasis is placed on how controlled design of such systems affects emission band positions and fluorescence lifetimes, both in colloidal solutions and at the single-particle level. Additionally, nonlinear optical parameters are analyzed, including changes in the two-photon absorption cross-section and effects related extinction saturation.[3] The findings are further complemented by femtosecond transient absorption measurements, providing insight into ultrafast processes occurring in these nanomaterials on the femtosecond to nanosecond timescale.[4]

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corresponding author: marta.gordel-wojcik@uwr.edu.pl