



Supramolecular self-assembly of water-soluble nanoparticles based on amphiphilic *p*-*tert*-butylthiacalix[4]arenes with silver nitrate and fluorescein



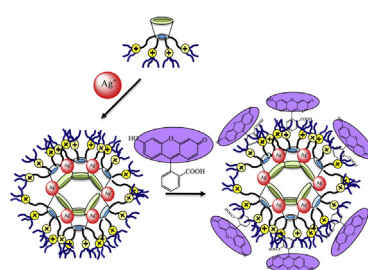
Elena A. Andreyko, Pavel L. Padnya, Ivan I. Stoikov*

Kazan Federal University, A.M. Butlerov Chemical Institute, Kremlevskaya 18, 420008 Kazan, Russian Federation

HIGHLIGHTS

- New *p*-*tert*-butylthiacalix[4]arenes were synthesized and characterized.
- The effective interaction of the calix[4]arenes with fluorescein was shown.
- The formation of supramolecular assemblies with fluorescein was observed.
- Formed supramolecular particles effectively interact with BSA.

GRAPHICAL ABSTRACT



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ABSTRACT

New *p*-*tert*-butylthiacalix[4]arenes containing amide, ester, phthalimide and quaternary ammonium fragments in *cone* conformation were synthesized and characterized. The effective interaction of the *p*-*tert*-butylthiacalix[4]arenes with silver nitrate and fluorescein was shown by electron spectroscopy. As was shown by dynamic light scattering (DLS) all the macrocycles are able to form nanoscaled particles with silver nitrate. In the case of fluorescein, the formation of supramolecular assemblies was observed only for *p*-*tert*-butylthiacalix[4]arenes able of self-associating. It was shown that the interaction of nanoparticles based on the macrocycles and silver nitrate or fluorescein with bovine serum albumin (BSA) led to the formation of the particles of about 7 nm in size.

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1. Introduction

Synthesis of the nanoscale structures for molecular recognition of different substrates is one of the perspective tendencies of the investigations in the supramolecular chemistry and nanotechnology [1–4]. Nanoscale particles can be used to the formation

of sensors, catalysts, biomimetic systems, selective extractants and drug delivery systems [5–11]. Nanosized structures can be by covalent synthesis or supramolecular self-assembly. The spontaneous association of a number of chemical compounds (ligands) due to non-covalent intermolecular interactions is most convenient way to create nanosized particles [1,2,12–31]. The formation of supermolecules and supramolecular assemblies by self-assembly makes it possible to control shape, “dentate” of colloidal particles and their ability to interact with substrates. Depending on the nature of functional groups of ligand, nanosize particles soluble in organic and

* Corresponding author. Tel.: +7 843 2337241; fax: +7 843 2752253.
E-mail address: Ivan.Stoikov@mail.ru (I.I. Stoikov).