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DYE-CONTAINING MONODISPERSE POLYMER PARTICLES AS STRUCTURAL ELEMENTS OF PHOTONIC CRYSTALS

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There has been a great interest in formation of 3D ordered structures from dye-containing monodisperse polymeric particles. If the particle diameter is in the submicron range, periodically-modulated refractive index of such materials caused photonic crystalline features in the visible region. The photonic band gap (PBG), where electromagnetic waves can not propagate, is capable of hiding emission of the dye inside polymeric arrays. These materials could be applied as gas chemisensors of high sensitivity, since emission spectra could be changed or shifted under or from under the PBG after interaction with some vapours.

Monodisperse poly(styrene-*co*-methacrylic acid) particles were prepared by emulsifier-free emulsion copolymerization using $K_2S_2O_8$ and modified with Rhodamine 6G and Nile Red. Besides, poly(styrene-*co*-N-vinylformamide) particles were prepared using 2,2'-azobis[2-(2-imidazolin-2-yl) propane] dihidrochloride. At the last polymerization step *p*-aminostyrene were introduced in the particle shells, because aromatic amino groups were shown to be convenient for the synthesis of various dyes on the particle surface by azo coupling. Thin 3D ordered films of the particles obtained were fabricated on glass slides by self-assembling. SEM and scanning spectroscopy were applied to prove well-ordered structure of the films. Effects of dye content, particle diameter and film thickness, as well as acetone or ethyl acetate vapors on fluorescence and reflection spectra were studied. Obtained results showed a good promise of dye-containing photonic crystals as chemisensors.

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