

Chameleon photonic crystals: Acid-induced emission and absorption shifts for sensor applications

Autorzy

Weronika Zając

Maciej Czajkowski

Joanna Cybińska

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Thanks to their optical properties, photonic crystals are a very interesting group of modern materials. Their applicability is further enhanced by the possibility of doping with stimuli-responsive compounds. This paper presents a preparation and characterization of photonic crystals doped with a luminescent dye – ethyl eosin. By doping with this dye, a material with sensor properties and unique optical properties such as angle-dependent emission was obtained. The study focused on determining the luminescence properties of the opals and the dye, specifically their quantum yield (QY). Moreover, the obtained dye-doped photonic crystals exhibit a rapid change in luminescence properties and color after contact with vapors of inorganic acids commonly used in industry. Furthermore, a three-dimensional opal doped with ethyl eosin exhibits a selective change in the presence of nitric acid(V), unlike the dye solution. These luminescent and sensing properties, coupled with reversibility, make this material fascinating.

Słowa kluczowe

photonic crystal, sensor properties ethyl eosin, luminescent dye

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