

Fluorescent dyes as a additives with variable optical properties by 3D printing technology for the preparation of fluorescent composites

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Abstract

3D printing is a technology that is beginning to appear in every area of life. Every day, a new possibility of 3D printing applications is studied. In 3D printing dyes usually are used for aesthetical purpose. However the possibilities of obtaining fluorescent materials by photopolymer-based 3D printing could help in developing many research areas including eg. sensors or imaging technologies[1]. In our work we would like to present the pilot studies showing the possibility of using fluorescent compounds with variable optical properties, which can be adapted as needed, as an additives in 3D printing. For this purpose, the compounds such as a chromophore from BODIPY family [2], europe complex or eosin was selected which show absorption over 500 nm while keeping high fluorescence yields. 3D printing experimets were performed using comercial available composition (Standrad clear, 3DUV) with addition of tested compounds (0,001 weight% of composition). As a light source laser LED with emission maximum at 405 nm was used. Progress of the photopolymerization process was observed by real time FT-IR measurement, performed with LED laser light source, with emission maximum at 405 nm. The polymerization process was carried out in thick layer (1,4 mm). Presented systems showed excellent optical properties, exhibit fluorescent properties and all obtained printed patterns exhibited excellent spatial resolution. In most case, after addition of fluorescent dyes no significant change in polymerization process was observed which gives the basis for further research on the presented systems

Keywords: fluorescent materials; FT-IR; photopolymerization; polymers; microscopy