

## Single mode step-index polymer optical fiber for humidity insensitive high temperature fiber Bragg grating sensors - DTU Orbit (08/11/2017)

### Single mode step-index polymer optical fiber for humidity insensitive high temperature fiber Bragg grating sensors

We have fabricated the first single-mode step-index and humidity insensitive polymer optical fiber operating in the 850 nm wavelength ranges. The step-index preform is fabricated using injection molding, which is an efficient method for cost effective, flexible and fast preparation of the fiber preform. The fabricated single-mode step-index (SI) polymer optical fiber (POF) has a 4.8 $\mu$ m core made from TOPAS grade 5013S-04 with a glass transition temperature of 134°C and a 150  $\mu$ m cladding made from ZEONEX grade 480R with a glass transition temperature of 138°C. The key advantages of the proposed SIPOF are low water absorption, high operating temperature and chemical inertness to acids and bases and many polar solvents as compared to the conventional poly-methyl-methacrylate (PMMA) and polystyrene based POFs. In addition, the fiber Bragg grating writing time is short compared to microstructured POFs.

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Authors: Woyessa, G. (Intern), Fasano, A. (Intern), Stefani, A. (Intern), Markos, C. (Intern), Nielsen, K. (Intern), Rasmussen, H. K. (Intern), Bang, O. (Intern)

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