The Use of Yttria-Alumino-Silicate Bismuth Doped Fibers for Temperature Sensing.

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Abstract.

Yttria-alumino-silicate fibers heavily doped with bismuth (BI) are investigated for fluorescence temperature sensing within the interval 25 ⍰C ... 500 ⍰C at 750-nm (LED) excitation. High doping with Bi which resulted in a high concentration of Bi active (fluorescing) centers, is shown to permit the use of short pieces of the fibers as “point” sensors, which is advantageous for applications. Theoretical backgrounds of three commonly utilized sensing techniques, based on measuring fluorescence intensity ratio, fluorescence lifetime, and frequency-domain referencing, are developed and compared, aiming for effective temperature sensing using these fibers.