

Fabry – Perot interferometer based on end-of-fiber polymer tip for humidity and temperature sensing

T.N. Pham, C. Ayela

Laboratoire IMS, Université de Bordeaux, CNRS, Bordeaux INP, UMR 5218, F-33607 Pessac, France

In this work, we present a Fabry-Perot interferometer (FPI) based on a micro-length polymer tip for humidity and temperature sensing. The polymer tip of pentaerythritol triacrylate (PETA) is fabricated by self-guiding photo-polymerization at the end of a fiber optic, forming a low fineness Fabry-Perot interferometer. The polymer tip is sensitive to the relative humidity (RH) of the ambient because of the swelling effect of PETA material. The sensor shows a constant sensitivity of 54 pm/%RH for RH ranging from 30% to 80%. In addition, the polymer tip is also sensitive to the temperature based on the thermal expansion and thermo-optic effect. The sensor has an average sensitivity of 34 pm/°C over a temperature range from 25°C to 60°C. With a compact size, low-cost, and simple fabrication, the presented sensor is promising for environment monitoring application.

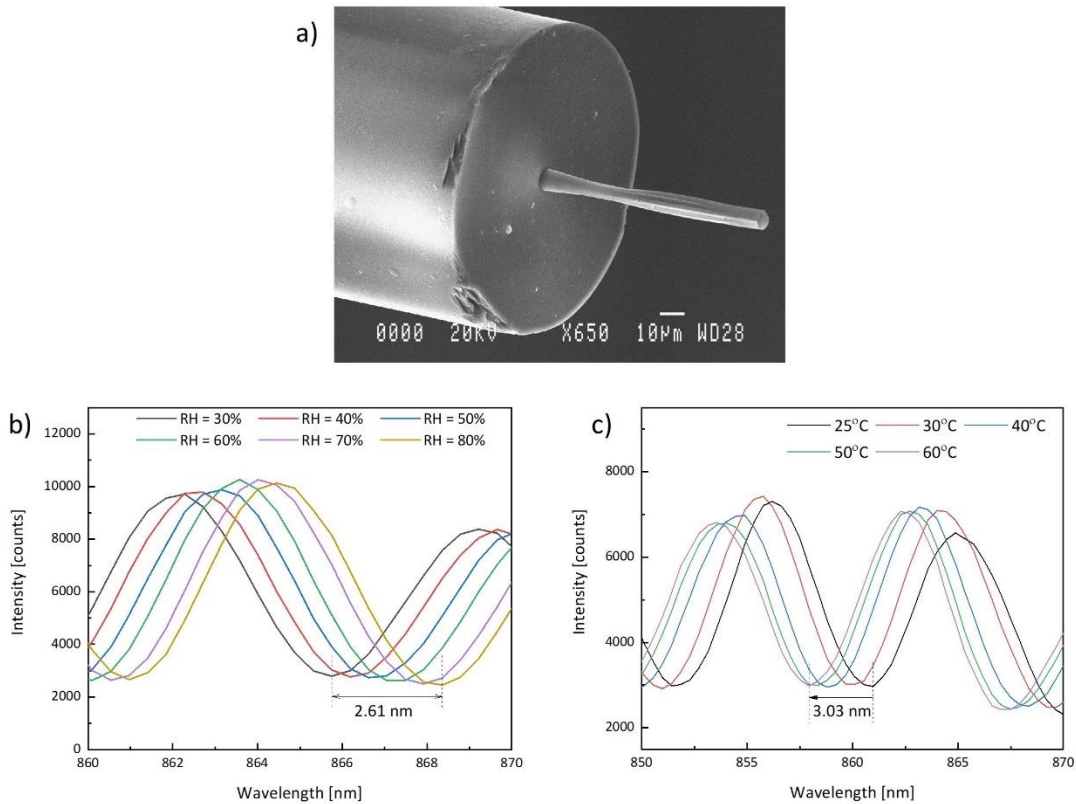


Figure 1: (a) SEM image of the polymer tip at the end of an optic fiber. FPI signal of the sensor as a function of relative humidity (b) and temperature (c).