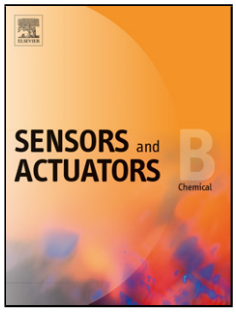

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Electrospun nanofiber mats for evanescent optical fiber sensors

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ABSTRACT

In this work, a study about the optical response of Electrospun Nanofiber (ENF) coatings for their use in evanescent optical fiber sensors is presented. Several types of ENF mats composed of poly(acrylic acid) (PAA) were developed with different ENF diameters and densities. These ENF mats were deposited onto an optical fiber core in order to fabricate humidity evanescent optical fiber sensors. The devices were exposed to Relative Humidity (RH) variations from 30% RH to 95%RH. The transfer functions of the devices (transmitted optical power versus relative humidity) presented two well-differenced behaviors depending on the ENF diameter and the ENF mat density. The devices with lower ENF diameters and higher mat density showed an increase in the transmitted optical power when RH increased. On the contrary, the devices with higher ENF diameters and lower mat density showed a decrease in the transmitted optical power when RH increased. In addition to this, sensors with thinner ENF overlays, showed a higher sensitivity. In order to study the response time of these devices, the ENFs sensors were submitted to human breathing cycles and presented a response time around 340 ms