

# STUDY OF SUPERHYDROPHILIC NANOPARTICLE-BASED ULTRA-THIN FILMS TOWARDS THE DEVELOPMENT OF OPTICAL FIBER HUMIDITY SENSORS

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*Abstract- The study of new nanostructured transparent materials in order to control the permeability properties of the objects is a very interesting field of research due to its enormous applications in optical and electronics among others. With the aim of achieving superhydrophilic coatings it is very important to control some coating parameters such as the water affinity of the coating materials and the overall thickness and roughness at the nanometer scale. In this work transparent superhydrophilic ultra-thin coatings have been fabricated with the Layer-by-Layer (LbL) technique using different diameter SiO<sub>2</sub> nanoparticles. These coatings were characterized to optimize their behavior and were applied to optical fiber substrates in order to create superhydrophilic optical interferometric cavities. These cavities show an optical response to Relative Humidity (RH) variations that are suitable for high performance sensing applications such as human-breathing monitoring.*

**Index terms:** *Humidity sensor, Layer-by-Layer, Optical fiber sensor, SiO<sub>2</sub> nanoparticles, Superhydrophilic surfaces, Nanostructured materials.*