Supporting Information

Stretchable reflective coating for soft optical waveguides and sensors

Simone Lantean[*a], Matteo Lo Preti[a,b], Lucia Beccai[a]

a- Soft Bio Robotics Perception, IstitutoItalianodi Tecnologia (IIT), Genova, Italy

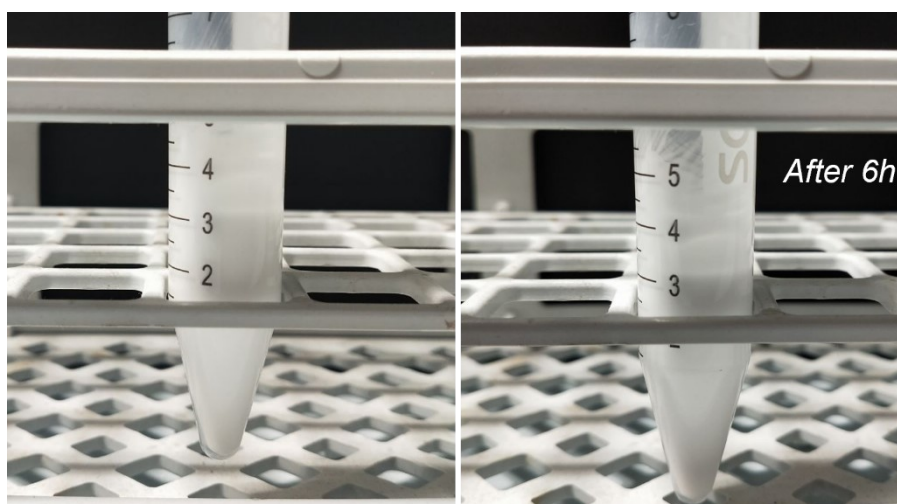b- The Bio Robotics Institute, Scuola Superiore Sant'Anna, Pontedera, Italy

Figure S1: Evaluation of PDMS_1vol.% TiO$_2$ stability after 6 hours.

Neural network to predict TiO2 particles concentration

The chosen feedforward neural network has 10 hidden neurons. Starting from the experimental data, a dataset augmentation procedure allowed us to obtain an input set of 1845371 samples and 3 features (i.e., layer width, wavelength, and transmittance). This dataset was randomly divided into training, validation, and test sets with a ratio of 70%, 15%, and 15%. The network was trained using the Levenberg-Marquardt backpropagation optimization algorithm and the mean square error to evaluate the performance.
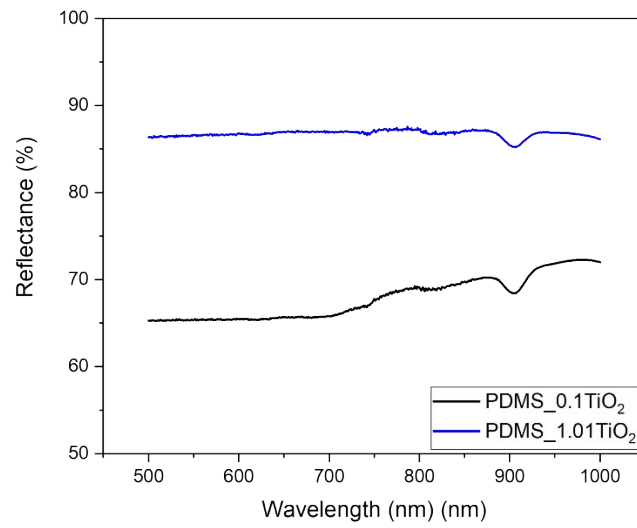
Figure S2: Sketch of the experimental devices used to evaluate the reflecting properties of PDMS film filled woth 1.00 vol.% of TiO2 particles.
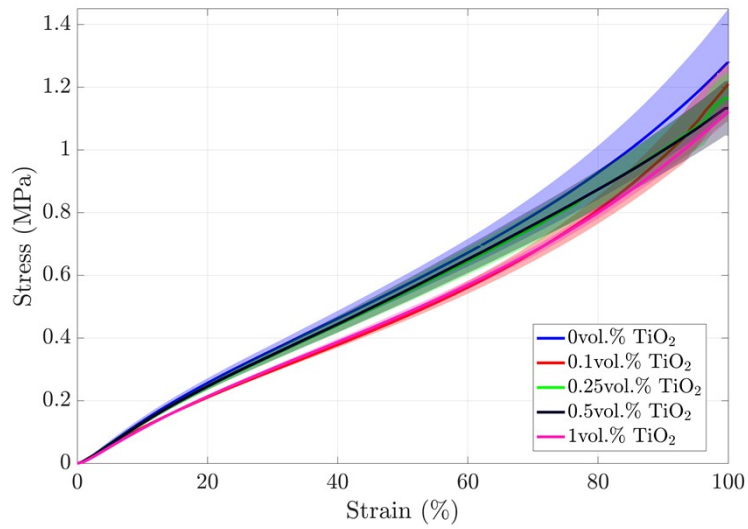

Figure S3: Stress vs Strain curves of PDMS samples at increasing TiO2 particles concentrations (0.1, 0.25, 0.50, and 1.00 vol%). The filled portion of the curves represents the standard deviation of the measurements.
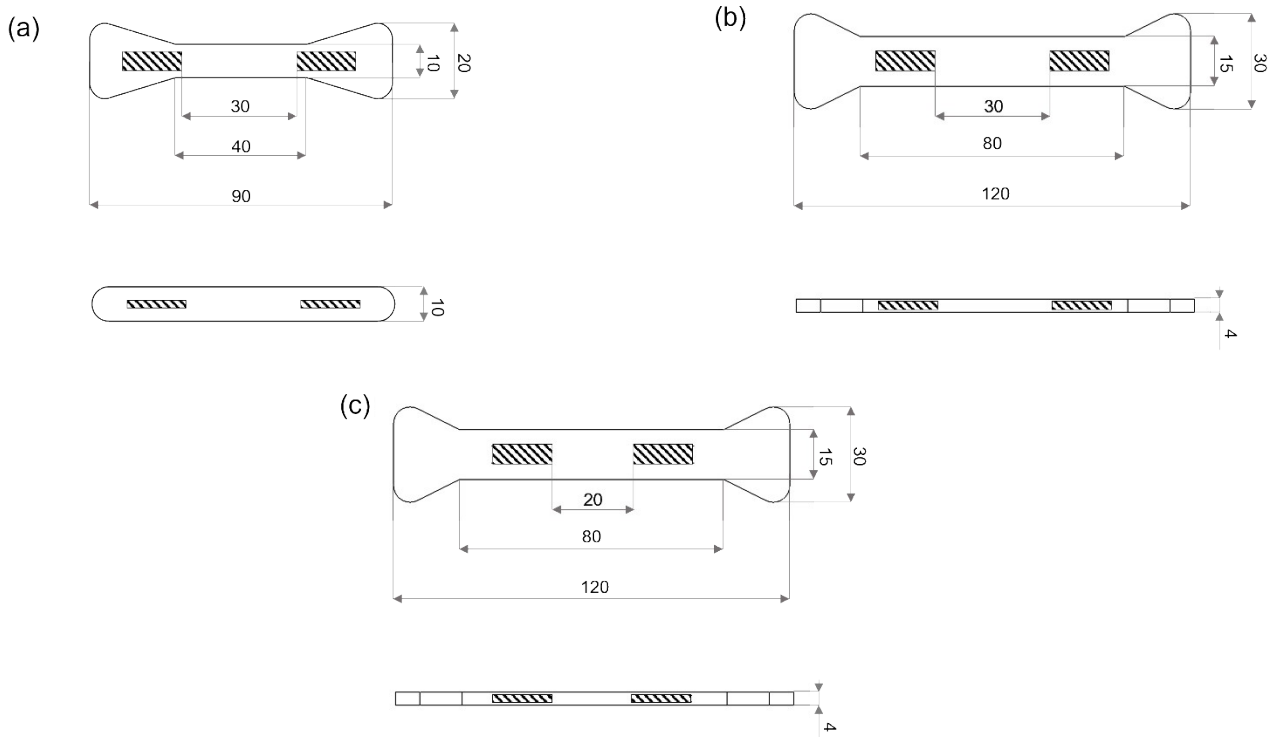
Figure S4: Sketch and dimensions of transparent a) rectangular waveguide, b) circular waveguide, and c) the strain sensor.
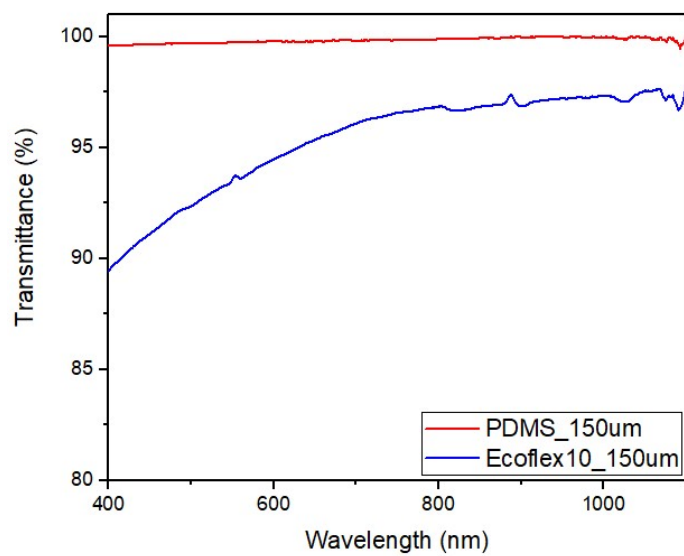

Figure S5: UV-Vis-NIR spectra of 150um thick films of pristine PDMS and Ecoflex0010.