Supplementary Materials: Sustainable, Fluorine-Free, Low Cost and Easily Processable Materials for Hydrophobic Coatings on Flexible Plastic Substrates

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Figure S1: Formula of stearic acid.
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Figure S1. Formula of stearic acid.

Figure S2. Chemical reaction for the functionalization of ZnONPs with stearic acid.

Figure S3. Effect of the surface structuring on the hydrophobicity, which increases from left to right.

Figure S4. ATR spectrum of pure ZnO nanopowder.
Table S1. Parameters used for the deposition of the ZnONPs/stearic acid coatings.

<table>
<thead>
<tr>
<th>Process</th>
<th>1st step</th>
<th>Thermal treatment</th>
<th>2nd step</th>
<th>Thermal treatment</th>
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</thead>
<tbody>
<tr>
<td><strong>GP2</strong></td>
<td>ZnONPs (13% w/w in EtOH)</td>
<td>Gravure Printing parameters: printer IGT G1-5; engraved cylinder line density = 70 lines/cm; stylus angle = 120°; screen angle = 53°; printing force = 700 N; printing speed = 60 m/min</td>
<td>Stearic acid (30 mg/mL in EtOH)</td>
<td>Gravure Printing parameters: printer IGT G1-5; engraved cylinder line density = 70 lines/cm; stylus angle = 120°; screen angle = 53°; printing force = 100 N; printing speed = 12 m/min</td>
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<tr>
<td><strong>AB2</strong></td>
<td>ZnONPs (5 mg/mL in EtOH)</td>
<td>Airbrushing Painting parameters: Iwata mod. Neo Nozzle size = 0,35 mm Pressure = 3 bar Working distance = 20 cm.</td>
<td>Stearic acid (20 mg/mL in EtOH)</td>
<td>Airbrushing Painting parameters: Iwata mod. Neo Nozzle size = 0,35 mm Pressure = 3 bar Working distance = 20 cm.</td>
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<tr>
<td><strong>GP1</strong></td>
<td>ZnO + stearic acid in EtOH (10 mg/mL)</td>
<td>Gravure Printing parameters: printer IGT G1-5; engraved cylinder line density = 70 lines/cm; stylus angle = 120°; screen angle = 53°; printing force = 500 N; printing speed = 60 m/min</td>
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<td><strong>AB1</strong></td>
<td>ZnO+ stearic acid in EtOH (2.5 mg/mL)</td>
<td>Airbrushing Painting parameters: Iwata mod. Neo Nozzle size = 0,35 mm Pressure = 3 bar Working distance = 20 cm</td>
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Figure S5. Scheme of the experimental setup for the electrical calcium test. The thick external rectangle represents the climatic chamber.

Figure S6. Normalized conductance vs time for the electrical calcium test carried out on bare PEN (black trace), and on ZnONPs coatings on PEN obtained by gravure printing (blue trace) and by airbrushing (red trace).
Figure S7. Normalized conductance vs time for the electrical calcium test carried out on bare PEN (black trace), and on ZnONPs/stearic acid coatings on PEN obtained by the gravure printing one step (GP1, blue trace) and two steps (GP2, magenta trace) approach.

Figure S8. Normalized conductance vs time for the electrical calcium test carried out on bare PEN (black trace), and on ZnONPs/stearic acid coatings on PEN obtained by the airbrushing one step (AB1, blue trace) and two steps (AB2, magenta trace) approach.
Figure S9. 4-Wires sensing geometry for electrical calcium test measurements.

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