Tunable wettability via counterion exchange of the polyelectrolyte brushes grafting on cotton fabric

Cheng Jiang\textsuperscript{a,b}, Qihua Wang\textsuperscript{a,*} and Tingmei Wang\textsuperscript{a}

\textsuperscript{a} State Key Laboratory of Solid Lubrication, Lanzhou Institute of Chemical Physics, Chinese Academy of Sciences, Lanzhou 730000, PR China

\textsuperscript{b} Graduate School, Chinese Academy of Sciences, Beijing 100039, PR China

*Corresponding author. E-mail: Wangqh@lzb.ac.cn
Table S1. The CA of the PMETAC films in different solvents.

<table>
<thead>
<tr>
<th>H₂O/CH₃OH(V/V)</th>
<th>1/0</th>
<th>3/1</th>
<th>1/1</th>
<th>1/3</th>
<th>0/1</th>
</tr>
</thead>
<tbody>
<tr>
<td>CA(°) in different solvents</td>
<td>PFO</td>
<td>152</td>
<td>153</td>
<td>154</td>
<td>154</td>
</tr>
<tr>
<td>SCN⁻</td>
<td>152</td>
<td>150</td>
<td>&lt; 5</td>
<td>&lt; 5</td>
<td>&lt; 5</td>
</tr>
</tbody>
</table>

Five volume ratios of H₂O and CH₃OH were selected to study the wettability change of PMETAC films bearing with PFO and SCN⁻ respectively. We found that when the volume ratio of H₂O/CH₃OH was 3/1, the wettability of the PMETAC films after exchange from PFO to SCN⁻ showed almost no change. However, the wettability switch can be realized when the volume ratio CH₃OH was further increased. In H₂O and CH₃OH mixture, when the ratio of CH₃OH was too low, the poorly solvated PFO ions mainly surrounded by water molecule and the counterion exchange from PFO to SCN⁻ was incomplete, so the wettability showed little change. While the volume ratio of CH₃OH increased, the reversible switch of PMETAC film can be achieve.

Figure S1. The stability of the CA on the PMETAC films bearing with PFO immersing in CH₃OH/H₂O (V/V: 1/1) mixture.

The CA values were measured at room temperature (about 22 °C) and the relative humidity was about 40 %.

The stability of the CA was measured on the same sample when a water droplet was deposited on the surface after 1 min up to 20 min.