Interpenetrating polymer networks based on commercial silicone elastomers and ionic networks with high dielectric permittivity and self-healing properties

Ogliani, Elisa; Yu, Liyun; Skov, Anne Ladegaard

Publication date:
2016

Document Version
Peer reviewed version

Link back to DTU Orbit

Citation (APA):
Interpenetrating polymer networks based on commercial silicone elastomers and ionic networks with high dielectric permittivity and self-healing properties

Elisa Ogliani (1), Liyun Yu (1), Anne Ladegaard Skov (1)

(1) The Danish Polymer Centre, Department of Chemical and Biochemical Engineering, Technical University of Denmark, 2800 Kgs. Lyngby, Denmark
Interpenetrating polymer networks based on commercial silicone elastomers and ionic networks with high dielectric permittivity and self-healing properties

Elisa Ogliani
Technical University of Denmark
elisa.ogliani@yahoo.it

Ionically assembled silicone polymers:
- Softening effect
- Very high dielectric permittivity
- Self-healing properties

Covalently cross-linked silicones:
- Mechanical integrity
- High breakdown strength

Goal: DRIVING VOLTAGE
Performance = $\frac{\varepsilon'}{\gamma}$
Interpenetrating polymer networks based on commercial silicone elastomers and ionic networks with high dielectric permittivity and self-healing properties

Elisa Ogliani
Technical University of Denmark
elisa.ogliani@yahoo.it

... Overview of the improved properties

More than 100% elongation of the reasssembled samples

INCREASING IN LIFE-TIME of DEs

<table>
<thead>
<tr>
<th></th>
<th>$Y = 3G'$ [kPa] (0,01 Hz)</th>
<th>$\tan \delta_{(\text{rheo})}$ (0,01 Hz)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pure PDMS</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Commercial silicone LR3043/30</td>
<td>64,3</td>
<td>0,06</td>
</tr>
<tr>
<td>AMS162 + B12</td>
<td>252,3</td>
<td>0,08</td>
</tr>
<tr>
<td>IPNs LR3043/30 : (AMS162 + B12)</td>
<td>37,3</td>
<td>0,01</td>
</tr>
<tr>
<td></td>
<td>70 wt% : 30 wt%</td>
<td>255,1</td>
</tr>
<tr>
<td></td>
<td>50 wt% : 50 wt%</td>
<td>113,7</td>
</tr>
<tr>
<td></td>
<td>30 wt% : 70 wt%</td>
<td>30,9</td>
</tr>
<tr>
<td></td>
<td>10 wt% : 90 wt%</td>
<td>30,5</td>
</tr>
</tbody>
</table>
Interpenetrating polymer networks based on commercial silicone elastomers and ionic networks with high dielectric permittivity and self-healing properties

Elisa Ogliani
Technical University of Denmark
elisa.ogliani@yahoo.it

... For more informations you can visit my poster