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

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2.2.5

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
Actuation Performance = $\frac{\epsilon'}{Y}$

IPNs:

IONICALLY ASSEMBLED SILICONE POLYMERS:
- Softening effect
- Very high dielectric permittivity
- Self-healing properties

COVALENTLY CROSS-LINKED SILICONES:
- Mechanical integrity
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... Overview of the improved properties

More than 100% elongation of the reassembled samples

INCREASING IN LIFE-TIME of DEs

<table>
<thead>
<tr>
<th></th>
<th>$Y = 3G'$ [kPa] (0,01 Hz)</th>
<th>$\tan \delta_{(rheo)}$ (0,01 Hz)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pure PDMS</td>
<td>64,3</td>
<td>0,06</td>
</tr>
<tr>
<td>Commercial silicone LR3043/30</td>
<td>252,3</td>
<td>0,08</td>
</tr>
<tr>
<td>AMS162 + B12</td>
<td>37,3</td>
<td>0,01</td>
</tr>
<tr>
<td>IPNs LR3043/30 : (AMS162+B12)</td>
<td>70 wt% : 30 wt%</td>
<td>255,1</td>
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<tr>
<td></td>
<td>50 wt% : 50 wt%</td>
<td>113,7</td>
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<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>
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