Supporting Information

Benzocyclobutene-functional Double-Decker Silsesquioxane: Self-Assembled Hybrid Resin for High-Performance Dielectric and LED Encapsulants

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CONTENTS

Page2: Fig. S1: Performance comparison of the BCB-DDSQ resins with current encapsulant materials

Page3: Fig. S2: Possible schematic curing mechanism of 4BCB-DDSQ

Page4: Fig. S3: 1H NMR spectrum of DDSQ-2H
Page5: Fig. S4: 1H NMR spectrum of DDSQ-4H
Page6: Fig. S5: 13C NMR spectrum of 2BCB-DDSQ
Page7: Fig. S6: 13C NMR spectrum of 4BCB-DDSQ
Page8: Fig. S7: XRD spectra of DDNa, DDSQ-2H and DDSQ-4H
Page9: Fig. S8: XRD spectra of DVSBCB, p-2BCB-DDSQ and p-2BCB-DDSQ
Page10: Fig. S9: N2 adsorption-desorption isotherms and BJH-analyzed pore-size distribution of p-2BCB-DDSQ and p-4BCB-DDSQ resins
Page11: Fig. S10: Static contact angle of water on the surface of cured BCB-DDSQ resins
Page12: Fig. S11: The transmittance of cured BCB-DDSQ resins
Page13: Table. S1: The data of nanoindentation tests for the p-DVSBCB, p-2BCB-DDSQ and p-4BCB-DDSQ
Fig. S1: Performance comparison of the BCB-DDSQ resins with current encapsulants materials.
Fig. S2. Possible schematic curing mechanism of 4BCB-DDSQ

(When the temperature was above 180 °C, the four-membered ring of BCB opened and formed an o-quinodimethane active intermediate which can couple with each other or react with other olefins by Diels–Alder reactions.)
Fig. S3. $^1$H NMR spectrum of DDSQ-2H
Fig. S4. $^1$H NMR spectrum of DDSQ-4H
Fig. S5. $^{13}$C NMR spectrum of 2BCB-DDSQ
Fig. S6. $^{13}$C NMR spectrum of 4BCB-DDSQ
Fig. S7. XRD spectra of DDNa, DDSQ-2H and DDSQ-4H
Fig. S8. XRD spectra of DVSBCB, p-2BCB-DDSQ and p-2BCB-DDSQQ
Fig. S9. $N_2$ adsorption-desorption isotherms and BJH-analyzed pore-size distribution of p-2BCB-DDSQ and p-4BCB-DDSQ resins
Fig. S10. Static contact angle of water on the surface of cured BCB-DDSQ resins
Fig. S11. The transmittance of cured BCB-DDSQ resins.
### Supporting Information

**Table. S1** The data of nanoindentation tests for the p-DVSBCB, p-2BCB-DDSQ and p-4BCB-DDSQ

<table>
<thead>
<tr>
<th>sample</th>
<th>Elastic modulus (GPa)</th>
<th>Hardness (GPa)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Test1</td>
<td>Test2</td>
</tr>
<tr>
<td>p-DVSBCB</td>
<td>4.1</td>
<td>3.8</td>
</tr>
<tr>
<td>p-2BCB-DDSQ</td>
<td>3.0</td>
<td>2.8</td>
</tr>
<tr>
<td>p-4BCB-DDSQ</td>
<td>2.6</td>
<td>2.8</td>
</tr>
</tbody>
</table>