Supporting Information

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

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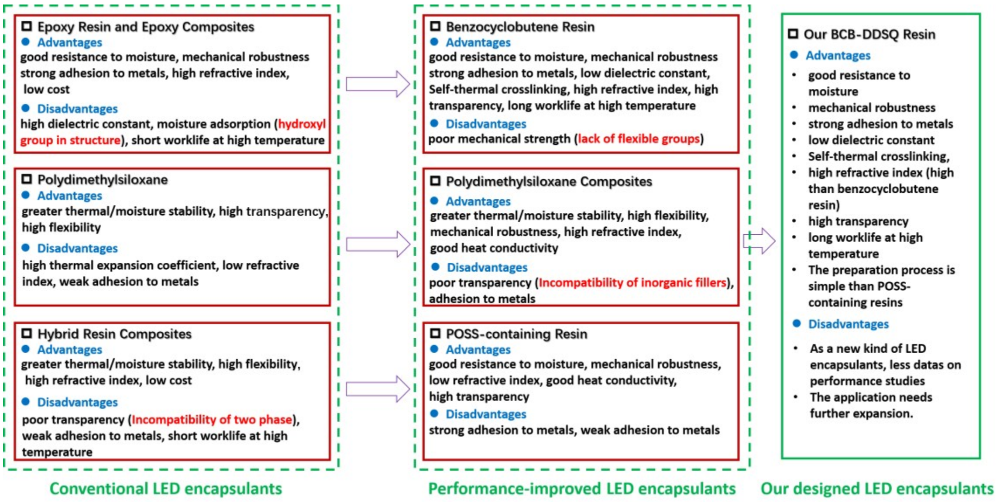

Fig. S1: Performance comparison of the **BCB-DDSQ** resins with current encapulants materials

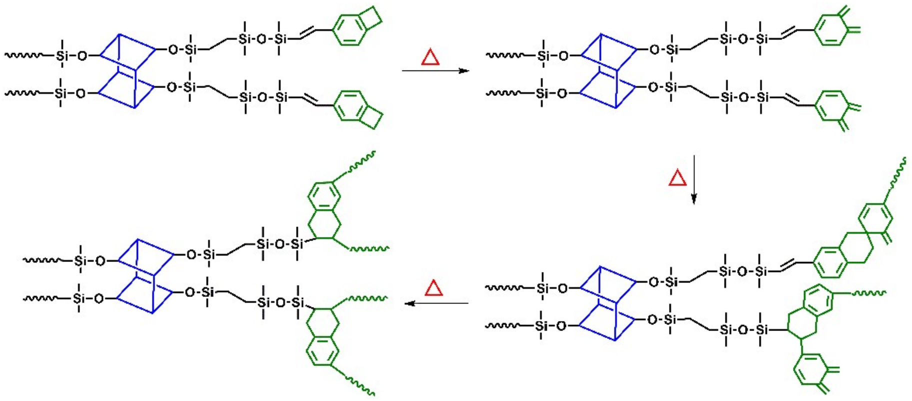

Fig. S2. Possible schematic curing mechanism of **4BCB-DDSQ**

（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.）

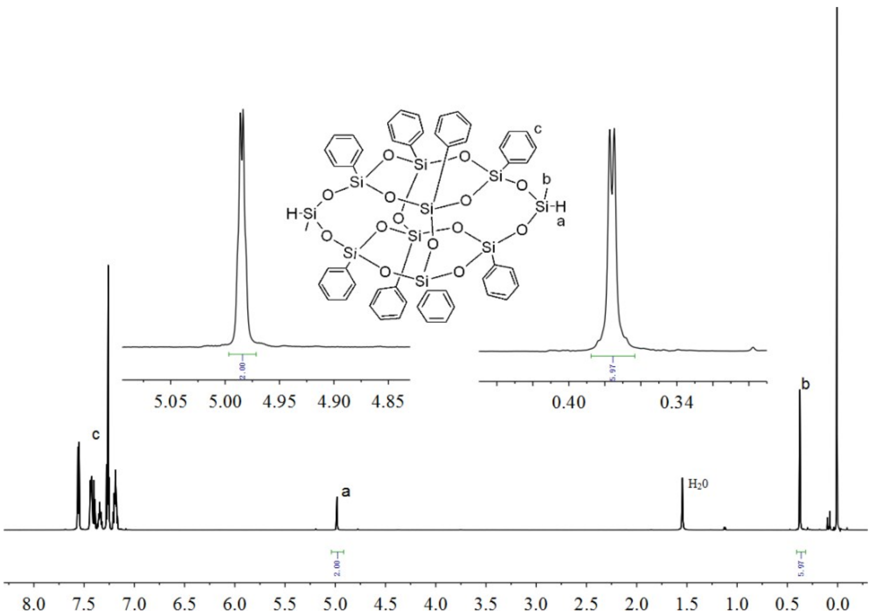

Fig. S3. ^{1}H NMR spectrum of **DDSQ-2H**

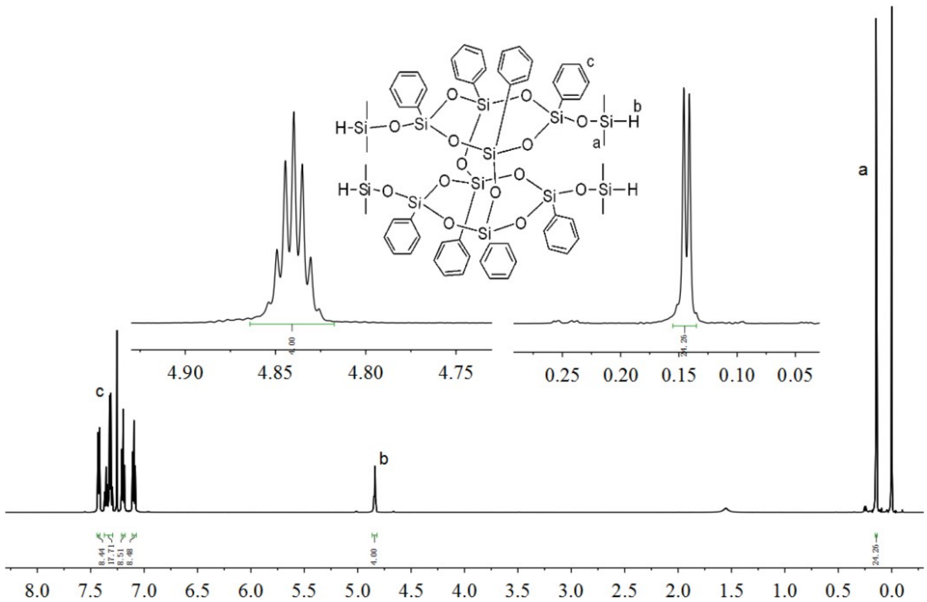

Fig. S4. ^{1}H NMR spectrum of **DDSQ-4H**

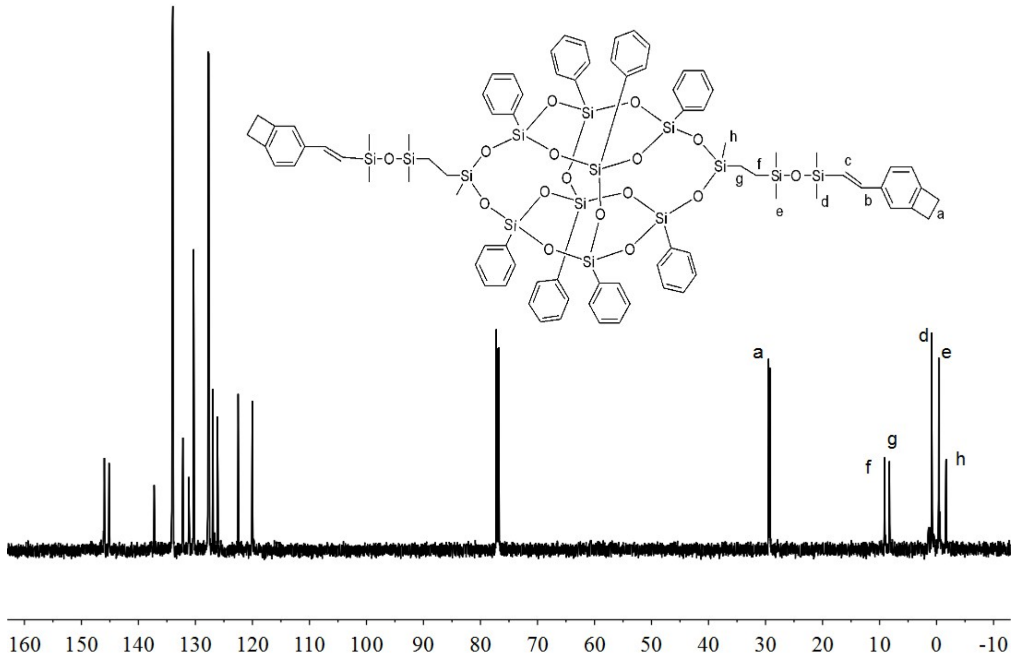

Fig. S5. ^{13}C NMR spectrum of **2BCB-DDSQ**

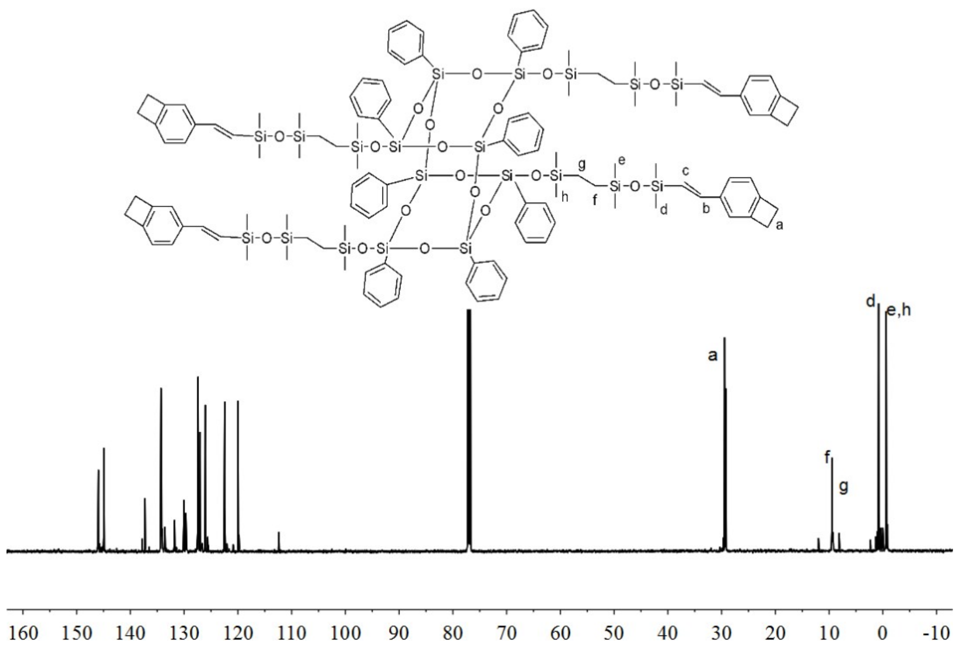

Fig. S6. ^{13}C NMR spectrum of **4BCB-DDSQ**

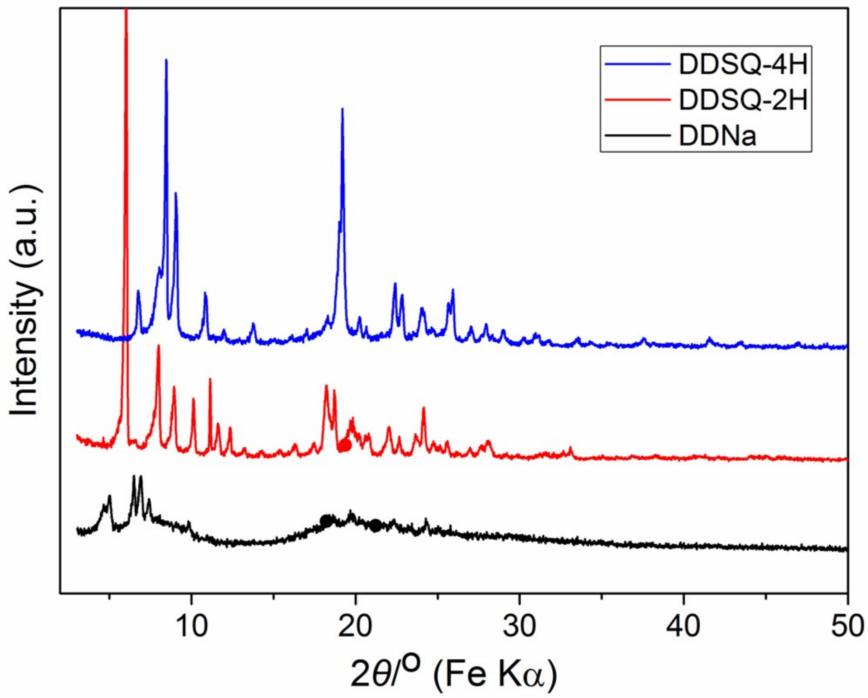

Fig. S7. XRD spectra of **DDNa**, **DDSQ-2H** and **DDSQ-4H**

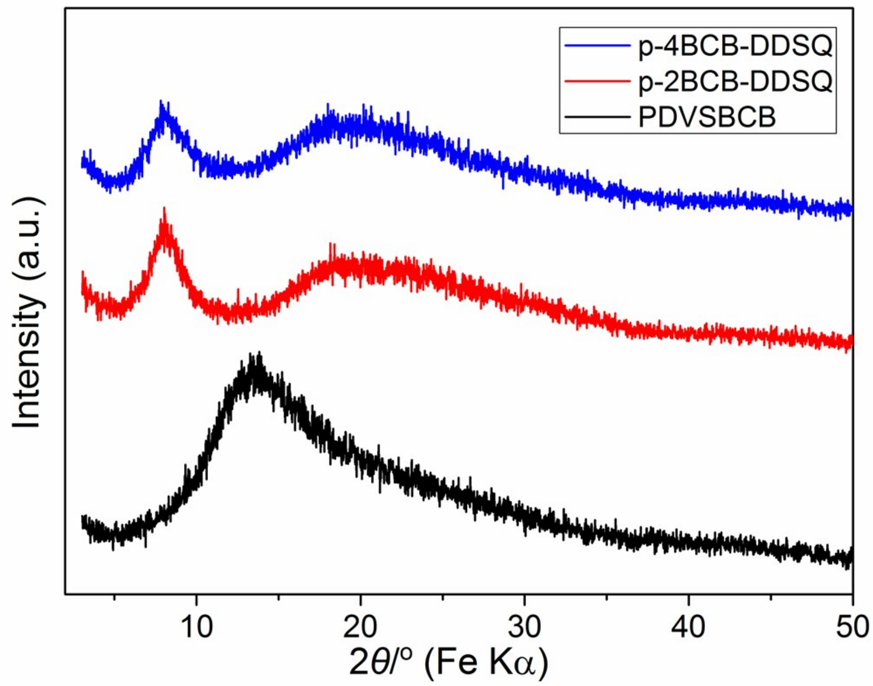

Fig. S8. XRD spectra of **DVSBCB**, **p-2BCB-DDSQ** and **p-2BCB-DDSQ**

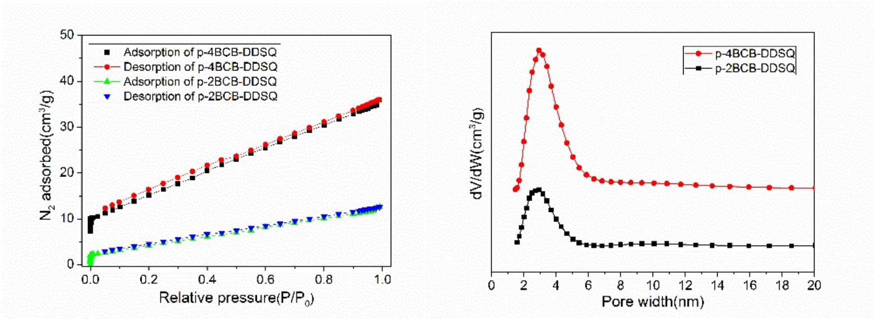

Fig. S9. N_2 adsorption-desorption isotherms and BJH-analyzed pore-size distribution of **p-2BCB-DDSQ** and **p-4BCB-DDSQ** resins

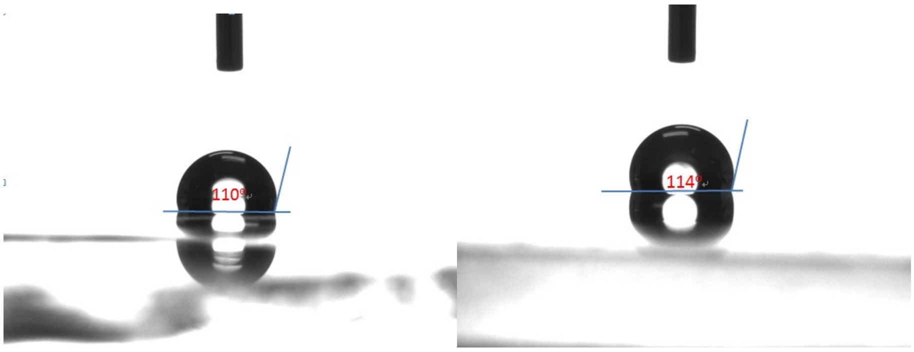

Fig. S10. Static contact angle of water on the surface of cured **BCB-DDSQ** resins

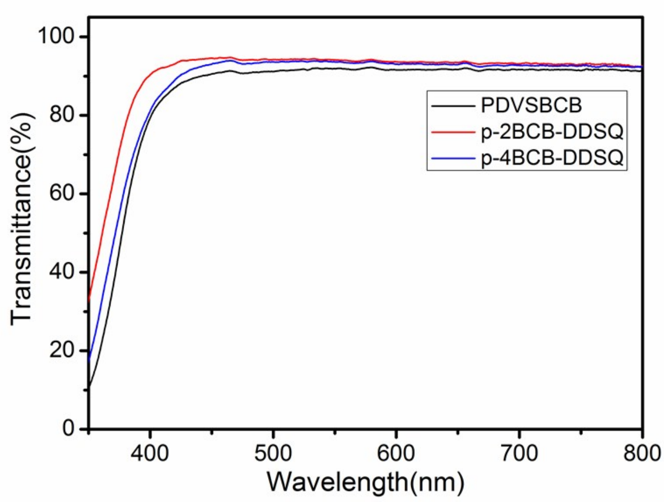

Fig. S11. The transmittance of cured **BCB-DDSQ** resins

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

sample	Elastic modulus (GPa)				Hardness (GPa)			
	Test1	Test2	Test3	Test4	Test1	Test2	Test3	Test4
p-DVSBCB	4.1	3.8	4.3	4.2	0.28	0.25	0.30	0.28
p-2BCB-DDSQ	3.0	2.8	2.9	3.0	0.17	0.16	0.16	0.18
p-4BCB-DDSQ	2.6	2.8	2.9	2.6	0.14	0.17	0.17	0.13