

## Supplementary Information

# **Room-temperature photopatternable low-dielectric cured resins derived from new polymers with siloxane-carbosilane hybridized structure**

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## 2 Experimental section

### 2.2 Characterization

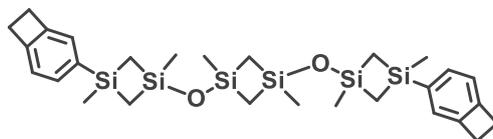
The swelling ratio was measured at room temperature using a gravimetric method. The dried sample was immersed in toluene until their weight difference became almost constant. The Samples were then removed from toluene and their surfaces were blotted with filter paper before being weighed. For each sample, a minimum of three measurements was taken, and the swelling ratio was calculated with the following equation:

$$\text{swelling ratio} = \frac{W_s - W_d}{W_d} \times 100 \%$$

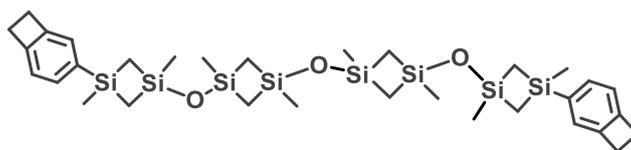
, where  $W_s$  is the weight of the swollen **Sample** and  $W_d$  is the weight of the dry **Sample**.

### 2.4 Synthesis of Oligomeric PCOS-4'

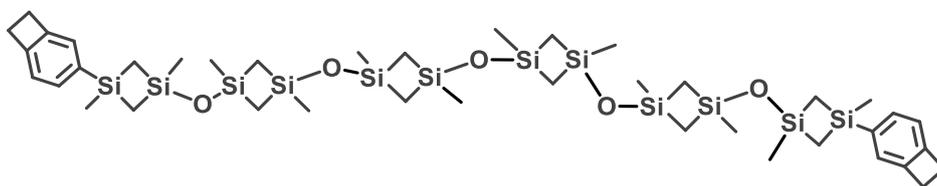
The reaction was carried out in a purified nitrogen atmosphere using standard Schlenk technique. In a typical experiment, DPDSCB (3, 0.696 g, 3 mmol) was added by H<sub>2</sub>O (0.216 g, 12 mmol) in a 50 mL round bottom flask. In another flask, magnesium (0.432 g, 0.018 mmol) and a grain of iodine were added. Then bromobenzene (2 g, 0.013 mmol) in 7 mL of dry THF was slowly added dropwise over a period of 30 min under nitrogen atmosphere. The reaction mixture was heated to 65 °C and stirred continuously for 3 h. Resulted solution was added to the first flask. The reaction temperature was elevated to 65 °C and kept overnight. Then, the solution was poured into 1 M aq. HCl and extracted with toluene. The organic layer was poured into a large excess of methanol. The precipitation was repeated for twice. The precipitate was dried under vacuum at 60 °C, giving a viscoelastic solid .



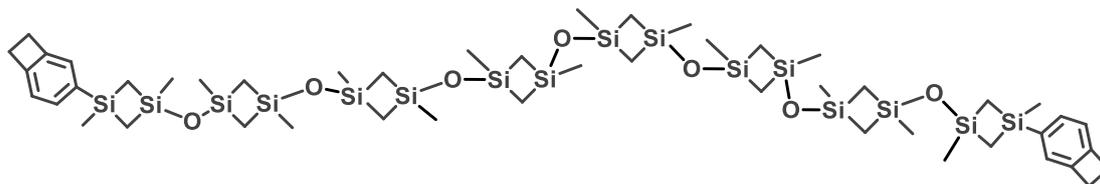
**Oligomeric PCOSs-C1, M=581.2 mol/g**



**Oligomeric PCOSs-C2, M=711.5**

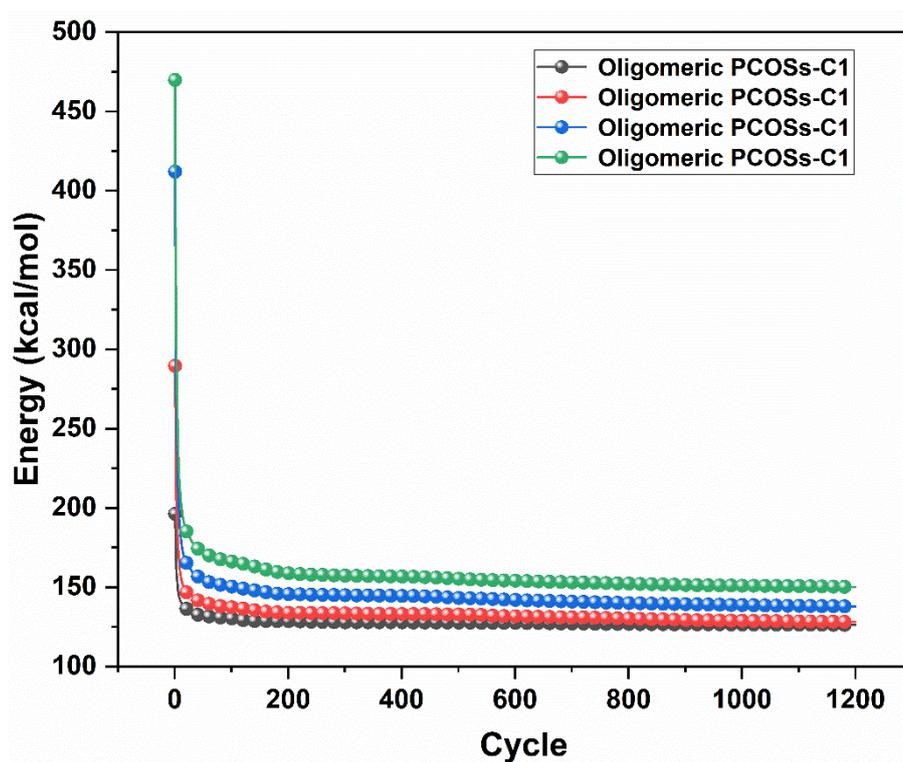


**Oligomeric PCOSs-C3, M=988.1**

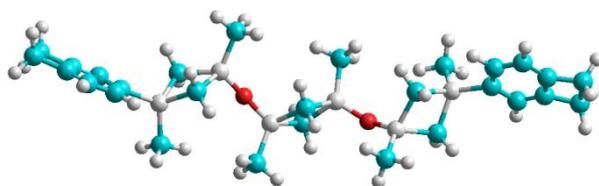


**Oligomeric PCOSs-C4, M=1248.7**

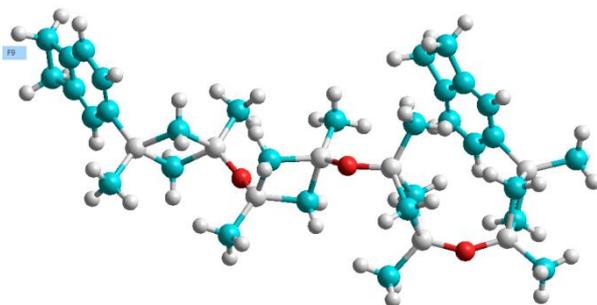
**Figure S1.** Chemical structures of Oligomeric **PCOSs** (n=n=1, 2, 4 and 6).



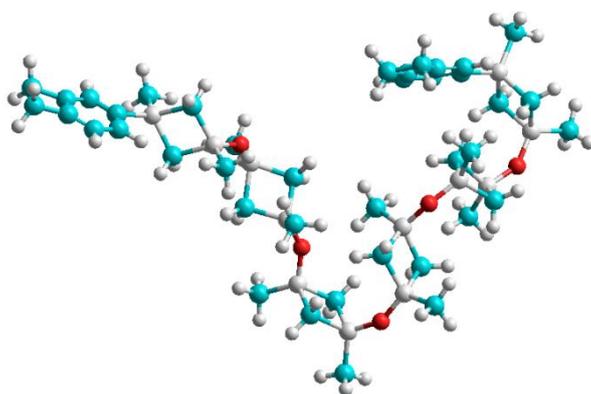
**Figure S2.** The total energy changes of Oligomeric **PCOSs** (n=1, 2, 4 and 6) optimized by using Hyperchem® Professional 8.0 (Hyperchem).



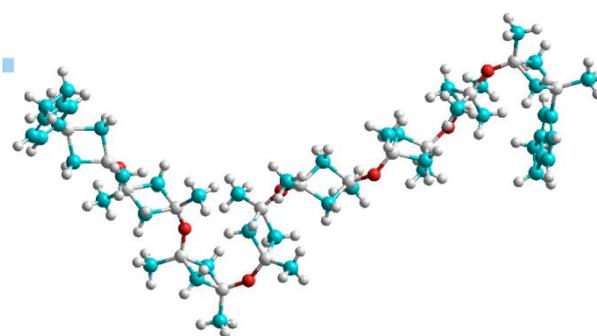
**Oligomeric PCOSs-C1, Total energy: 126.2 kcal/mol**



**Oligomeric PCOSs-C2, Total energy: 128.2 kcal/mol**

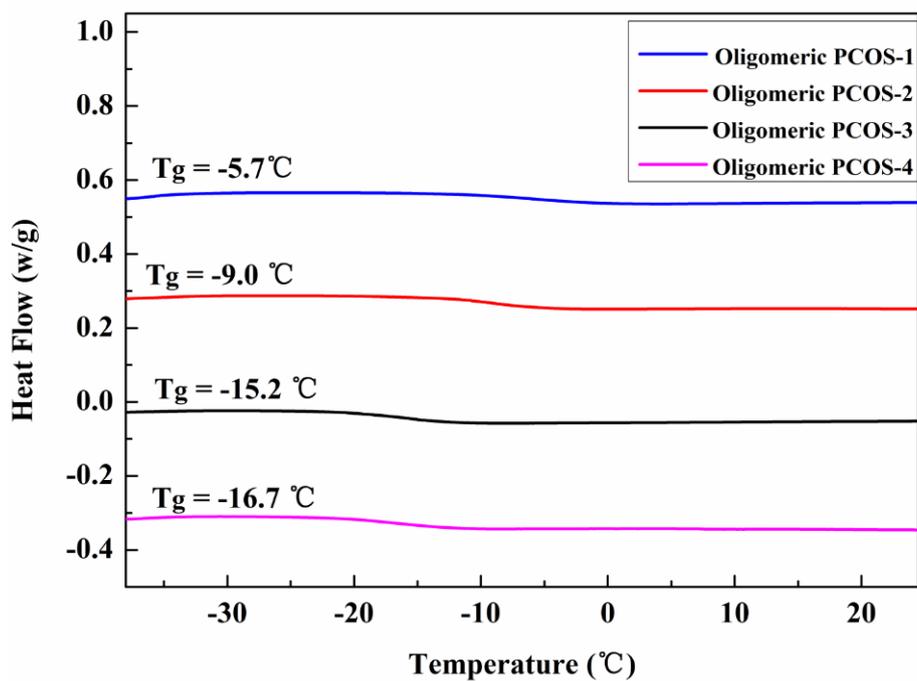


**Oligomeric PCOSs-C3, Total energy: 137.9 kcal/mol**

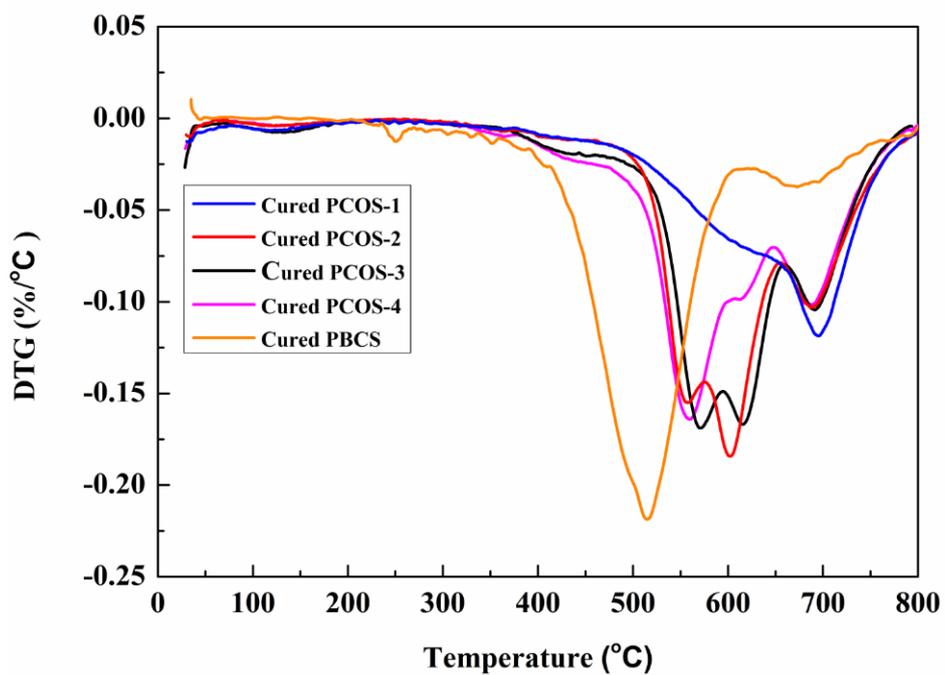


**Oligomeric PCOSs-C4, Total energy: 150.2 kcal/mol**

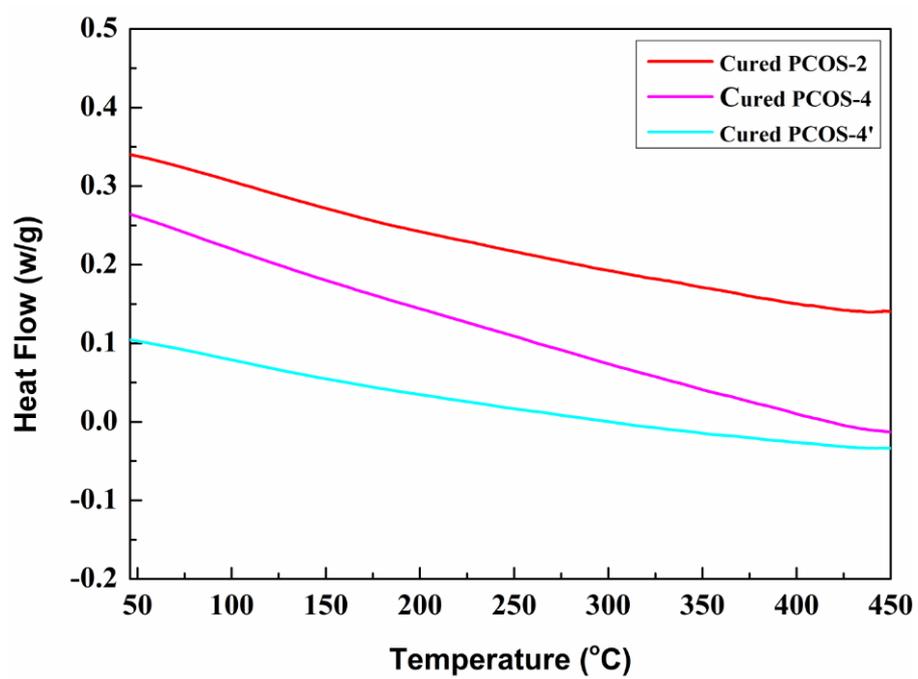
**Figure S3.** Geometrically structures of Oligomeric **PCOSs** ( $n=1, 2, 4$  and  $6$ ) optimized by using Hyperchem® Professional 8.0 (Hyperchem).



**Figure S4.** DSC curves of Oligomeric PCOSs.



**Figure S5.** DTG curves of cured PCOSs



**Figure S6.** DSC curves of cured PCOSs