# **Supporting Information**

## Debonding-on-demand adhesive based on photo-reversible

### cycloaddition reactions

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#### 1. NMR spectra



Fig. S1 <sup>1</sup>H NMR spectrum, <sup>13</sup>C NMR spectrum, <sup>29</sup>Si NMR spectra and MALDI-TOF-MS spectra of SS1

### 2. Monitoring of [2+2] cycloaddition reactions



**Fig. S2** Photo-conversion ratio of **SS1** a) after 365- and b) 254 nm irradiation. Reaction progress can be monitored by following the absorbance changes at 321 nm using **Equation 1**. (Irradiation intensity: 0.28 Jcm<sup>-2</sup> min<sup>-1</sup>)

#### 3. DSC measurement



**Fig. S3** DSC measurement of **SS1** a) before UV irradiation b) after 365 nm irradiation and c) after 254nm irradiation

Table S1 Summary of decrosslinked SS1 polymer			
	Mn	M <sub>w</sub>	Mz
0h	371000	6200000	31800000
1h	1760	1850	1980
2h	651	1160	2780
3h	1560	1580	1590

#### 4. GPC measurement



**Fig. S4** a) Weight retention rate versus time in aqueous solution. b) a water contact angle measurement on **SS1** polymer surface.

6. Dynamic rheology



**Fig. S5** The rheological properties of **SS1** before irradiation, 365nm irradiation for 60 min, and 254 nm irradiation for 5 min depend on frequency. *G*': storage modulus *G*'': loss modulus.