

**Supporting Information for**

**Supramolecular silicone dielectric elastomer with high dielectric constant, fast  
and highly efficient self-healing at mild conditions**

Haibin Sun<sup>1</sup>, Xueying Liu<sup>1</sup>, Suting Liu<sup>4</sup>, Bing Yu<sup>1</sup>, Nanying Ning<sup>\*,1,2,3</sup>, Ming  
Tian<sup>\*,1,2,3</sup> and Liqun Zhang<sup>1,2,3</sup>

1. Key Laboratory of Carbon Fiber and Functional Polymers, Ministry of Education,  
Beijing University of Chemical Technology, Beijing 100029, China;
2. State Key Laboratory of Organic-Inorganic Composites, Beijing University of  
Chemical Technology, Beijing 100029, China;
3. Beijing Advanced Innovation Center for Soft Matter Science and Engineering,  
Beijing University of Chemical Technology, Beijing 100029, China;
4. Department of Chemical Engineering, Weifang Vocational College, Weifang  
262737, China.

\* Corresponding authors. E-mail addresses: [tianm@mail.buct.edu.cn](mailto:tianm@mail.buct.edu.cn) (M. Tian);  
[ningny@mail.buct.edu.cn](mailto:ningny@mail.buct.edu.cn) (N. Ning)

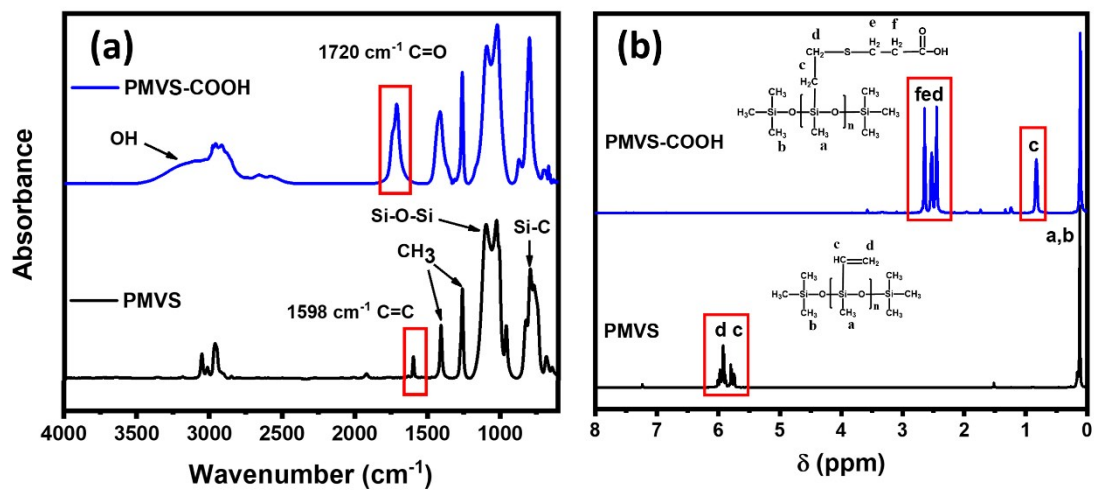


Figure S1. (a) FTIR and (b) <sup>1</sup>H NMR spectra of PMVS and PMVS-COOH.

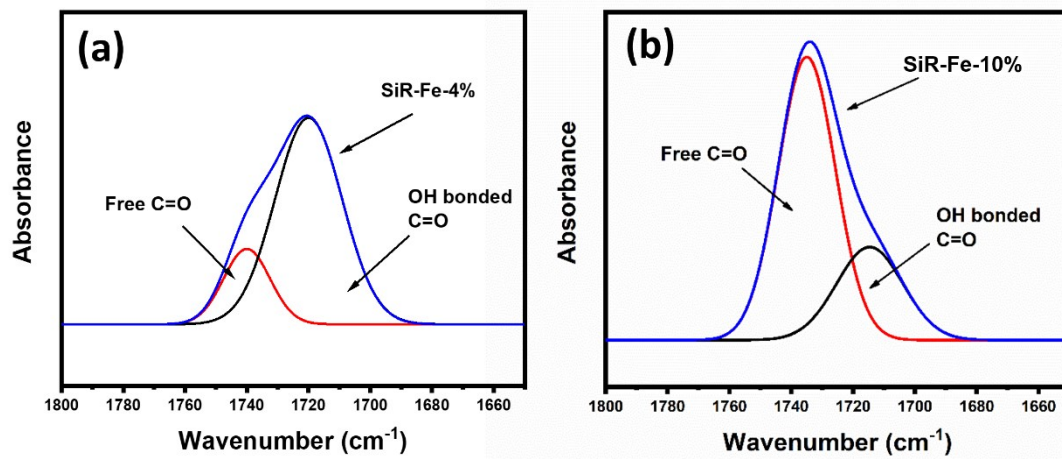


Figure S2. The curve fitting of carbonyl stretching region of (a) SiR-Fe-4%; (b) SiR-Fe-10%.

---

Table S1. Crosslink density of SiR-Fe.

---

Samples	SiR-Fe- 4%	SiR-Fe- 5%	SiR-Fe- 6%	SiR-Fe- 8%	SiR-Fe- 10%
Crosslink density (mol/mL)	$1.2 \times 10^{-4}$	$1.5 \times 10^{-4}$	$1.7 \times 10^{-4}$	$3.5 \times 10^{-4}$	$4.7 \times 10^{-4}$

---

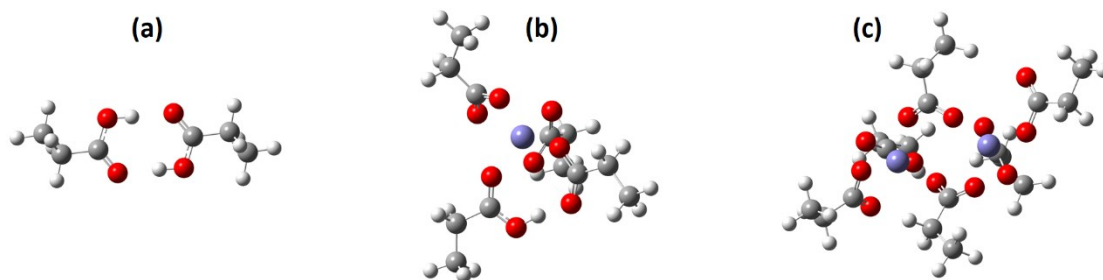


Figure S3. Dimer for the three combinations with lowest energy for (a)  $\text{COOH}\cdots\text{HOOC}$ , (b)  $\text{Fe}(\text{COO})_3\cdots\text{COOH}$ , and (c)  $\text{Fe}(\text{COO})_3\cdots\text{Fe}(\text{COO})_3$ .

Table S2. Interaction energy for some combinations in SiR-Fe calculated by DFT method.

Combinations	Interaction energy (kJ/mol)
$\text{COOH}\cdots\text{HOOC}$	-73
$\text{Fe}(\text{COO})_3\cdots\text{COOH}$	-121
$\text{Fe}(\text{COO})_3\cdots\text{Fe}(\text{COO})_3$	-317

---

Table S3. Mechanical properties and electromechanical sensitivity of SiR-Fe.

<b>Sample</b>	<b>Y (kPa)</b>	<b><math>\sigma</math> (kPa)</b>	<b><math>E_b</math> (%)</b>	<b><math>\beta</math> (MPa<sup>-1</sup>)</b>
<b>SiR-Fe-4%</b>	180	40	639	33
<b>SiR-Fe-5%</b>	220	100	425	23
<b>SiR-Fe-6%</b>	300	220	203	25
<b>SiR-Fe-8%</b>	460	310	161	27
<b>SiR-Fe-10%</b>	430	310	140	31

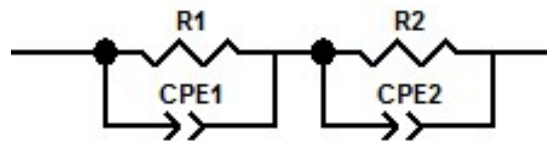
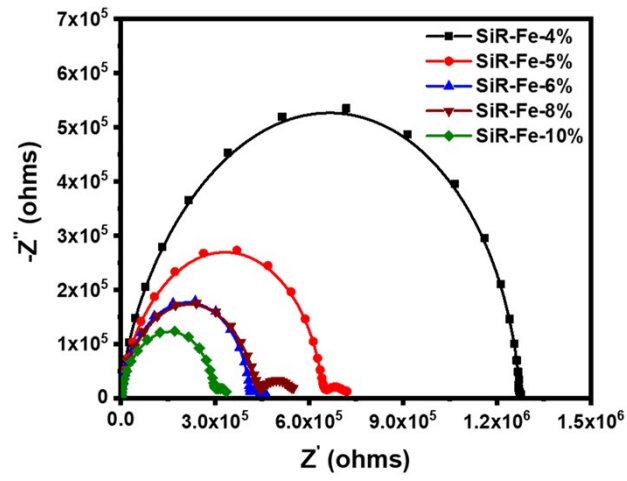


Figure S4. Nyquist plots (up) and the equivalent circuit (below) of SiR-Fe.