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Supporting Information

Heat-resistant polyurethane film with great electrostatic dissipation capacity and very high thermally reversible self-healing efficiency based on multi-furan and liquid multi-maleimide polymers

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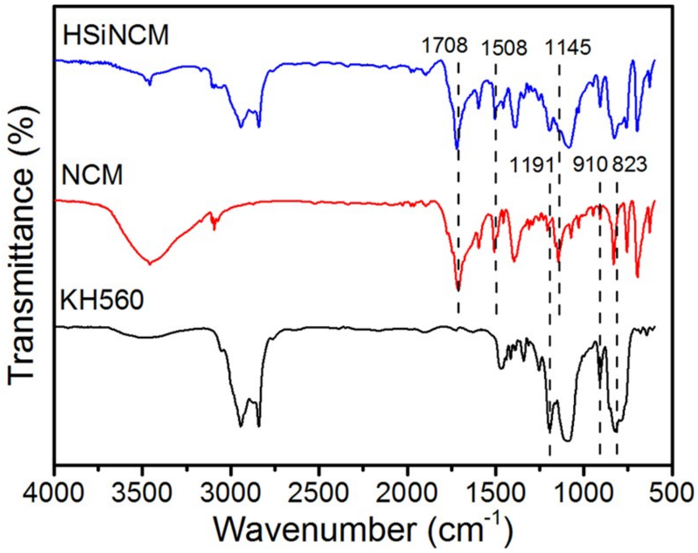

Fig.S1 FTIR spectra of KH560, NCM and HSiNCM

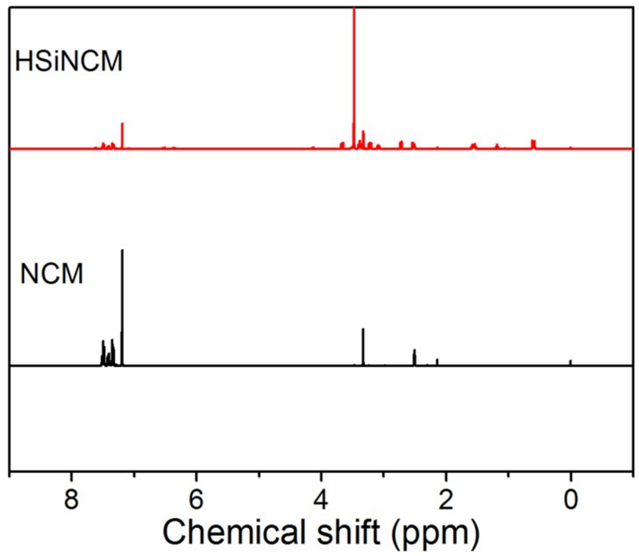

Fig.S2 ^{1}H-NMR spectra of NCM and HSiNCM

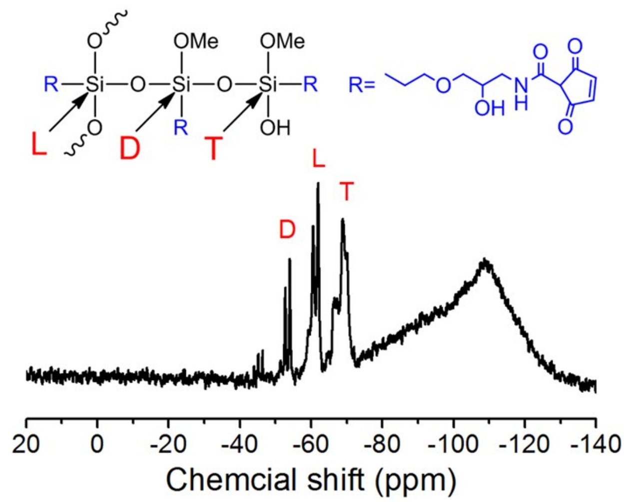

Fig.S3 The ^{29}Si-NMR spectrum of NCM and HSiNCM

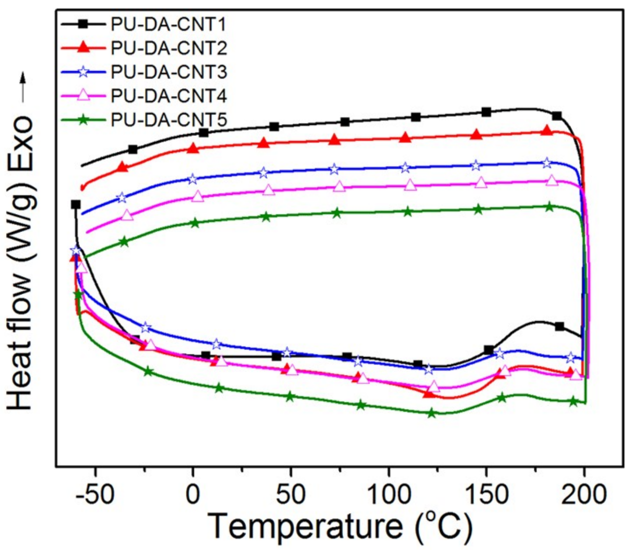

Fig.S4 DSC curves of healing and cooling cycles of PU-DA-CNT films

Table S1 Compositions and electrostatic dissipation capacity of films [a)]

Filler [b)]	Filler loading (wt%)	Polymer matrix [c)]	Surface resistivity	Electrostatic decay	Resistivity or conductivity	Heat-resistance (T_{di})	Ref
CNT	1-2	Acrylic	10^6-1.6×10^7	None	None	None	[S1]
PEDOT	10-30	PU	None	0.09-0.17s (37%)	2.8×10^{-8}-4.36×10^{-7}	None	[S2]
RGO	1.6 vol%	TPU	None	0.49s (37%)	None	None	[S3]
CNF	≈ 5-7	PEI	10^6-10^9	None	None	None	[S4]
CNT	0.5-1	Acrylic	≈10^6-10^9	None	None	None	[S5]
[C_4mim][Tf_2N]	10^3-10^5ppm	PU	10^6-10^9	None	None	None	[S6]
CNT	1.96	PU	3.094×10^8	0.07s (50%)	4.116×10^{-8}	283	This work

a) Some parameters not reported directly in the references are derived from the corresponding curves.

b) CNT: Carbon nanotubes; PEDOT: Poly(3,4-ethylene dioxythiophene); RGO: reduced graphene oxide; CNF: Cup-stacked carbon nanofibers; [C_4mim][Tf_2N]: 1-butyl-3-methylimidazolium bis(trifluoromethanesulfonyl)imide

c) Acrylic: Acrylic coatings; PU: Polyurethane coatings; TPU: Thermoplastic polyurethane PEI: Polyetherimide;

From Table S1 it is known that most publications provided only one or two properties to characterize electrostatic dissipation capacity of films. But in actual applications, it is necessary to measure the resistivity of both surface and body for a material as well as the dissipation speed of charge applied, so the three properties including surface resistivity, electrostatic decay and conductivity should be measured and analyzed. Compared with films reported previously, the film prepared herein has advantage of owning obviously better integrated properties of electrostatic dissipation capacity with a small loading of CNTs.

[S1] S. Kugler, K. Kowalczyk, T. Spychaj, *Progress in Organic Coatings*, 2016, **92**, 66-72.

[S2] M. Farukh, R. Dhawan, B. P. Singh, S. K. Dhawan, *RSC Advances*, 2015, **5**, 75229-75238.

[S3] M. Verma, P. Verma, S. K. Dhawan, V. Choudhary, *RSC Advances*, 2015, **5**, 97349-97358.

[S4] B. Li, W. H. Zhong, *Macromolecular Materials and Engineering*, 2010, **295**, 1136-1143.

[S5] S. Kugler, K. Kowalczyk, T. Spychaj, *Progress in Organic Coatings*, 2015, **85**, 1-7.

[S6] T. Iwata, A. Tsurumaki, S. Tajima, H. Ohno, *Macromolecular Materials and Engineering*, 2014, **299**, 794-798.