Supplementary Information

Enhanced actuated strain of titanium dioxide/nitrile-butadiene rubber composite by biomimetic method

Dan Yang[a,b], Shuo Huang[b,c], Yibo Wu[a,b], Mengnan Ruan[b,c], Shuxin Li[a,b], Yuwei Shang[a,b], Xiuguo Cui[a], Yang Wang[a], Wenli Guo[a,b*]

[a]Department of Material Science and Engineering, Beijing Institute of Petrochemical Technology, Beijing, 102617, China.

[b]Beijing Key Lab of Special Elastomeric Composite Materials, Beijing, 102617, China

[c]Materials Science and Engineering, Beijing University of Chemical Technology, Beijing 100029, China

*To whom correspondence should be addressed.

E-mail: gwenli@bipt.edu.cn

Table S1 Comparing actuated strain of 10 phr TiO_2-PDA/NBR composite with other EAP actuators

Material	Prestrain (x,y) (%)	Actuated strain [a] (%)	Field Strength [a] (MV/m)	Ref.
VHB 4910	540, 75	215	239	1
VHB 4905	300, 300	200	480	2
Silicone ENP SEBS161 (5-30 wt%)	300, 300	180-30	32-133	3
Silicone ENP SEBS 217(5-30 wt%)	300, 300	245-47	22-98	3
VHB 4910 acrylic	300, 300	158	412	1
VHB4910/poly(1,6-hexanediol diacrylate)	275, 275	233	300	4
HS3	280, 0	117	128	1
Silicone-based prototype	200% [b]	18.31	96	5
TiO_2/SEBS	100, 100	12	27.5	6
PMMA-PnBA-PMMA	100, 100	12	4.5	7
Silicone+30 wt%TiO_2	100, 100	11	10	8
PDMS/PHT	100, 100	7.6	8	9
polyurethane-based prototype	100% [b]	2.04	127	5
CF19-218	100, 0	63	181	1
HS3 silicone	68, 68	93	110	1
CF19-2186 silicone	45, 45	64	350	1
DC 3481(5%81-R)/20 wt%CPO	40, 40	11	27	10
CF19-2186 silicone	15, 15	33	160	1
VHB 4910 acrylic	15, 15	40	55	1

HS3 silicone	14, 14	69	72	1
Allyl-cyano/SiR	10, 10	7	20	11
TiO_2/PDMS	5, 5	18	50	12
DOP/HNBR	0, 0	22	30	13
Dipole/PDMS	0, 0	14.8	1.3	14
TiO_2/PDMS/DMSO	0, 0	13	30	15
PANI@PDVB/PDMS	0, 0	12	54	16
PEG/PDMS	0, 0	11.5	40	17
$BaTiO_3$/CB/PDMS	0, 0	7.46	30	18
PANI-g-PolyCuPc-g-PU	0, 0	7	23	19
23 wt%PANI/P(VDF-TrFE-CTFE)	0, 0	1.5 [c]	9.5	20
14PANI/15PolyCuPc/85PU	0, 0	9.3 [c]	20	21
SEBS-MA grafted PANI	0, 0	1.4	27	22
NBR/TiO_2/DOP	0, 0	3.04	20	23
18.26% v/v graphite/Polyurethane	0, 0	0.037	0.75	24
5 wt% CNTs/PDMS	0, 0	4.4	1.5	25
P(VDF-TrFE)/40 wt%CuPc	0, 0	1.91	13	26
Silicone oil/PMN/PDMS	0, 0	7.4	40	27
CNT/P(VDF-TrFE-CFE)	0, 0	2.5	72	28
P(VDF-TrFE-CFE)	0, 0	4.5	130	29
LC gels	0, 0	2.1	25	30
Polyester elastomer	0, 0	11.9	15.6	31
50 phr BT-PDA/HNBR	0, 0	20	45	32
m-BT/SR4	0, 0	26	12	33

TiO_2/PDMS/MDSO	0, 0	13	30	34
DAN/TPU	0, 0	2.6	20	35
SeRM	0, 0	10	23	36
Azo-g-PDMS	0, 0	17	67.5	37
Carbon black/PU	0, 0	18[c]	20	38
SiC@C-PU	0, 0	18[c]	18	39
PBDII	0, 0	25.5	42	40
TRG/TPU	0, 0	1.8	0.25	41
TiO_2/ESO/HNBR	0, 0	13.6	30	42
10 phr TiO_2-PDA/NBR	0, 0	5.2	12.5	

[a]Estimated from graphical data in cited reference, when there is no tabular was provided; [b]The axial prestrain; [c]The longitudinal strain.

As getting a high actuated strain under the condition of prestrain-free is a big object for researchers, we compared the actuated strain of 10 phr TiO_2-PDA/NBR composite with those of other dielectric elastomers reported in the literature under the condition of prestrain-free. It can be easily observed that the actuated strain (5.2%) of 10 phr TiO_2-PDA/NBR composite is relatively high, showing an obvious advantage in practical application.

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