

Electronic Supplementary Information

Preparation of graphene oxide/bio-based elastomer nanocomposites through polymer design and interface tailoring

He Qiao,^{a, b} Runguo Wang,^{a, b} Hui Yao,^a Xinxin Zhou,^{a, b} Weiwei Lei,^{a, b} Xiaoran Hu,^{a, b}

*Liqun Zhang^{a, b, c, *}*

^aState Key Laboratory of Organic–Inorganic Composites, Beijing University of Chemical Technology, Beijing 100029, China

^bKey Laboratory of Beijing City for Preparation and Processing of Novel Polymer Materials, Beijing University of Chemical Technology, Beijing 100029, China

^cBeijing Laboratory of Biomedical Materials, Beijing University of Chemical Technology, Beijing 100029, China

***Corresponding Author: Liqun Zhang**

E-mail: zhanglq@mail.buct.edu.cn.

Tel.: +86-10-64421186.

Fax: +86-10-64433964.

Polymerization recipe for PDBIIVP

Table S1. Recipe for redox-initiated emulsion polymerization of PDBIIVP.

Ingredient	PDBIIVP-0	PDBIIVP-1	PDBIIVP-2	PDBIIVP-3	PDBIIVP-4	PDBIIVP-5
Dibutyl itaconate	80	79	78	77	76	75
Isoprene /g	20	20	20	20	20	20
4-VP /g	0	1	2	3	4	5
Deionized	200	200	200	200	200	200
DPR /g	3.5	3.5	3.5	3.5	3.5	3.5
Potassium oleate	1.5	1.5	1.5	1.5	1.5	1.5
K ₃ PO ₄ /g	0.2	0.2	0.2	0.2	0.2	0.2
KCl /g	0.5	0.5	0.5	0.5	0.5	0.5
SHS /g	0.2	0.2	0.2	0.2	0.2	0.2
Fe-EDTA /g	0.04	0.04	0.04	0.04	0.04	0.04
TBH /g	0.14	0.14	0.14	0.14	0.14	0.14
HA /g	0.2	0.2	0.2	0.2	0.2	0.2

Dynamic viscoelastic properties of PDBIIVP

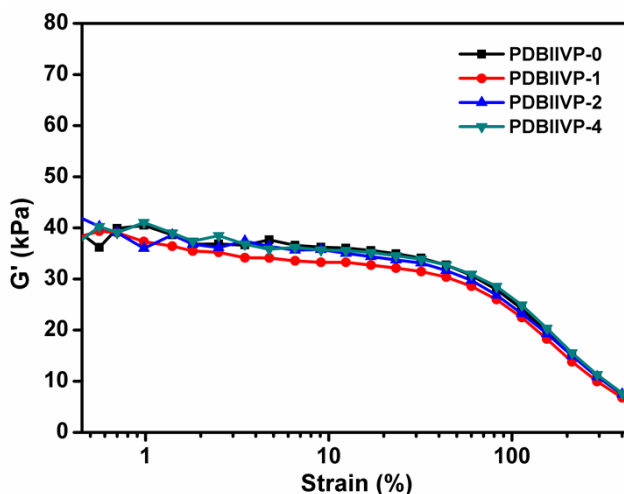


Figure S1. Storage modulus (G') versus strain curves of PDBIIVP with different 4-VP

contents.

Dynamic mechanical thermal analysis of PDBIIVP

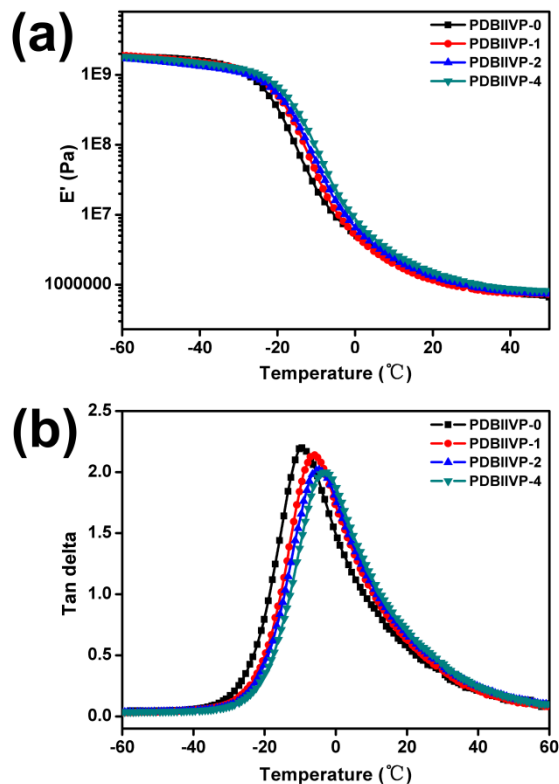


Figure S2. (a) E' and (b) $\text{tan}\delta$ versus temperature of PDBIIVP with different 4-VP contents.

(The compounding formulation for crosslinked PDBIIVP is the same as that of the GO/PDBIIVP nanocomposites.)

Mechanical properties of PDBIIVP

Table S2. Mechanical properties of PDBIIVP with different 4-VP contents.

Sample	Tensile	Elongation	Stress at	Permanent	Hardness
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	strength (MPa)	at break (%)	100% strain (MPa)	set (%)	(Shore A)
PDBIIVP-0	0.8±0.1	216±10	0.4±0.02	0	22
PDBIIVP-1	0.8±0.1	209±7	0.4±0.02	0	24
PDBIIVP-2	1.0±0.2	220±16	0.4±0.03	0	25
PDBIIVP-4	1.0±0.2	211±17	0.4±0.03	0	26

Gas barrier properties of PDBIIVP

Table S3. Permeability of PDBIIVP with different 4-VP contents.

Sample	Permeability ($\times 10^{-17} \text{m}^2 \text{Pa}^{-1} \text{s}^{-1}$) ¹⁾
PDBIIVP-0	8.81
PDBIIVP-1	8.62
PDBIIVP-2	8.56
PDBIIVP-4	8.06

Mechanical properties of GO/PDBIIVP nanocomposites with different 4-VP contents

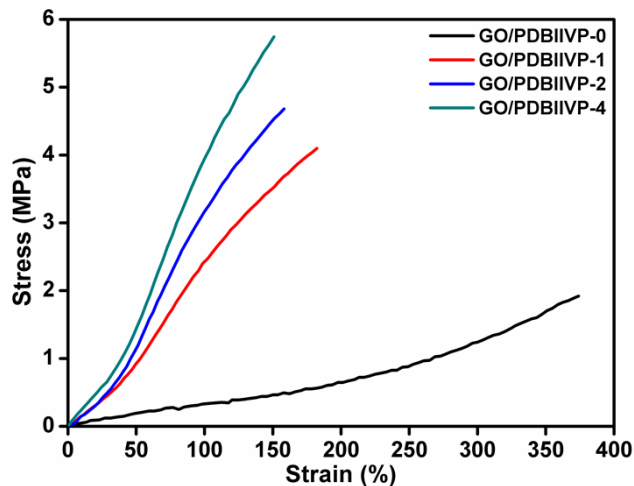


Figure S3. Representative stress-strain curves of GO/PDBIIVP nanocomposites with different 4-VP contents

Mechanical properties of GO/PDBIIVP nanocomposites with different GO loadings

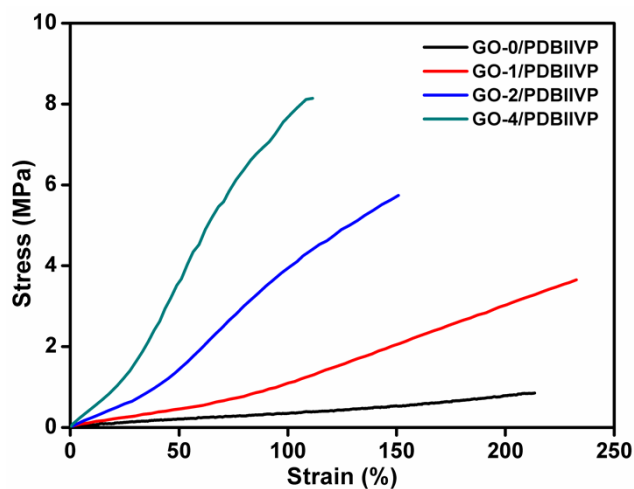


Figure S4. Stress-strain curves of GO/PDBIIVP nanocomposites with different GO loadings.