

Infrared Induced Repeatable Self-Healing and Removability of Mechanical Enhanced Graphene-Epoxy Flexible materials

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The comparison of the prepared self-healing epoxy polymers in this paper with other conventional epoxy polymer

The physical, mechanical, self-healing and removable properties of a series of epoxy polymers were evaluated and shown in **Table 1**. The stoichiometric ratios of epoxide groups and amine curing agents in all of the epoxy polymers were fixed to 1:1. The molar ratio of FDB and OGE in FDB/OGE/D230 and GNS/FDB/OGE/D230 epoxy polymers was 1: 1.5. The content of GNS fillers in GNS/FDB/OGE/D230 epoxy polymer was 0.5 wt%. The tensile strength and elongation at break for DGEBA/DETA, FDB/D230 and OGE/D230 were not evaluated.

Table.1 The properties of different epoxy polymers and GNS/epoxy composites.

Epoxy polymers	DGEBA/DETA	FDB/D230	OGE/D230	FDB/OGE/ D230	GNS/FDB/O GE/D230	
T_g (°C)	63	94	17	47	52	
Mechanical properties	Shear strength (MPa)	1.48±0.14	1.25±0.15	2.12±0.23	10.96±0.32	17.63±0.21
	Tensile strength (MPa)	-----	-----	-----	9.57±0.41	14.52±0.45
	Elongation at break (%)	-----	-----	-----	315.8±13.9	187.6±15.2
Recyclability	120 °C for 30 min	no	yes	no	yes	yes
	IR light heating	no	no	no	no	yes
Healing properties	70 °C for 24 h	no	no	no	yes	yes
	120 °C for 30 min and 70 °C for 24 h	no	yes	no	yes	yes
	IR light heating	no	no	no	no	yes

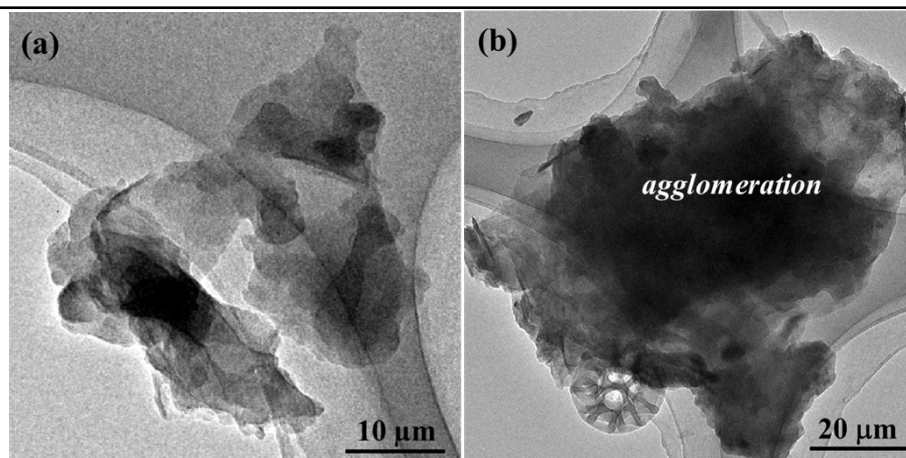


Fig.S1 TEM graph of GNS/FDB/OGE/D230 epoxy composites filled with 0.5 wt% GNS (a) and 0.7 wt% GNS fillers(b).

