Electronic Supplementary Material (ESI) for Journal of Materials Chemistry C.

Supporting Information

Stretchable Liquid Metal Electromagnetic-Interference Shielding Materials with Superior Effectiveness

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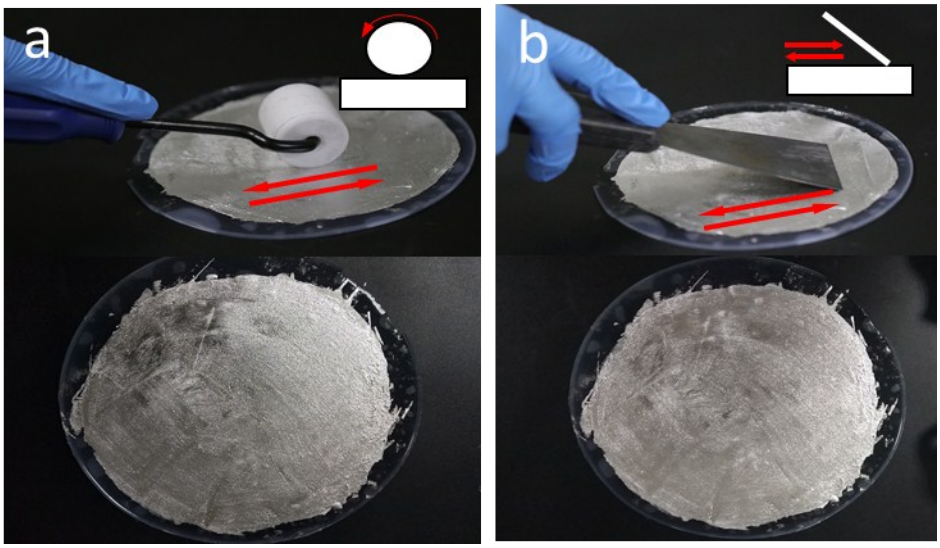

Figure S1. a) The fabrication of GIN coating using roller. b) The fabrication of GIN coating using scraper. Using scraper or roller could make the surface of GIN smooth.

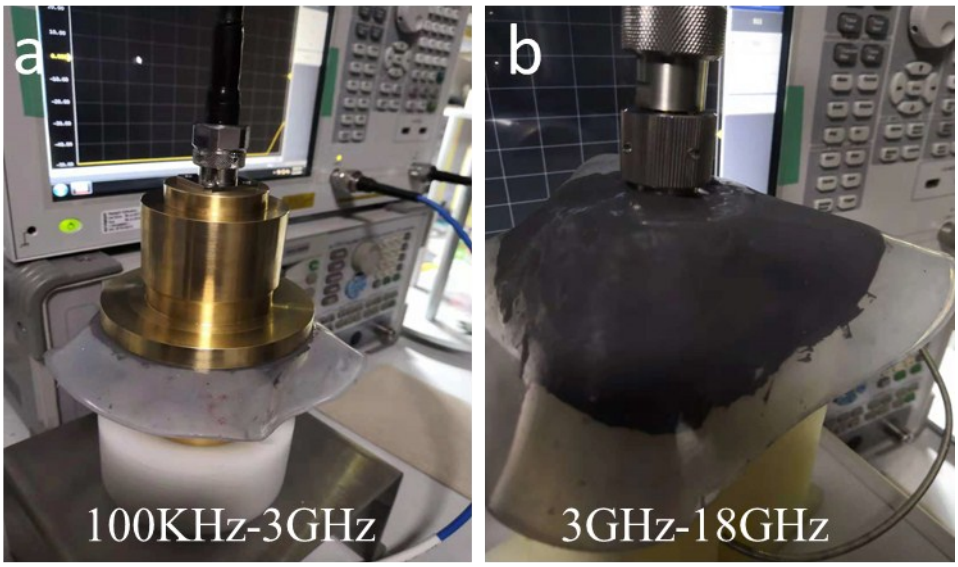

Figure S2. The measurement of EMI SE of GIN.

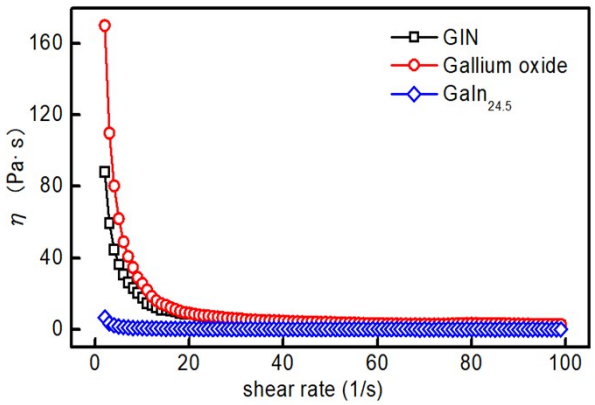

Figure S3. The rheological curves of GIN and the mixture comprising of gallium oxide and EGaIn.

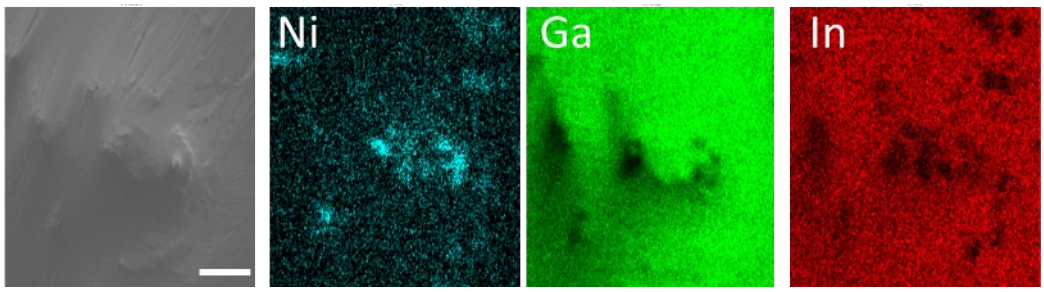

Figure S4. EDS show the distribution of Ga, In and Ni. The distribution of Ni is parallel to the bulge.

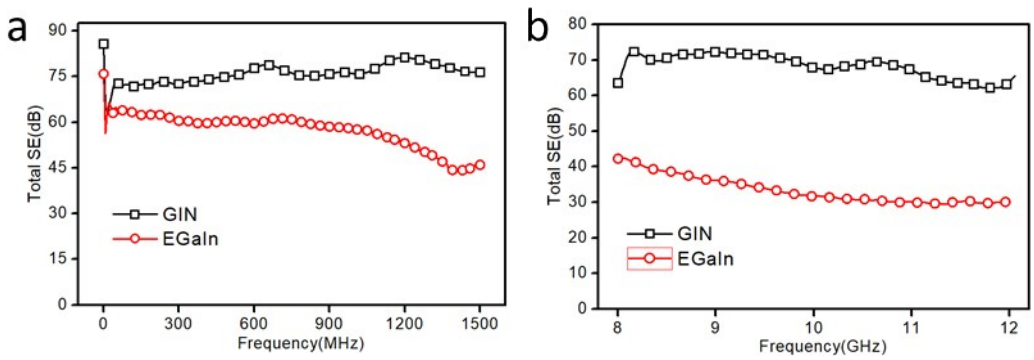

Figure S5. Comparison of EMI SE between GIN and EGaIn in the frequency of 100 KHz-1.5GHz and X band.

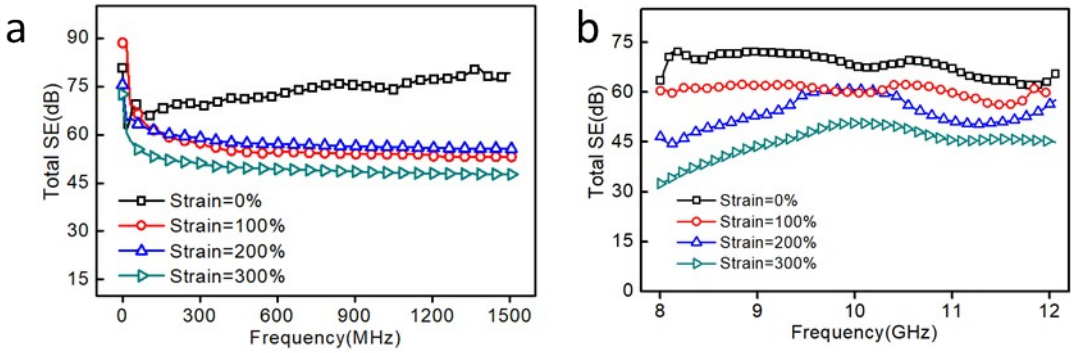

Figure S6. a) and b) EMI SE of GIN during stretching in the frequency of 100 KHz-1.5 GHz and 8 GHz-12 GHz, respectively.

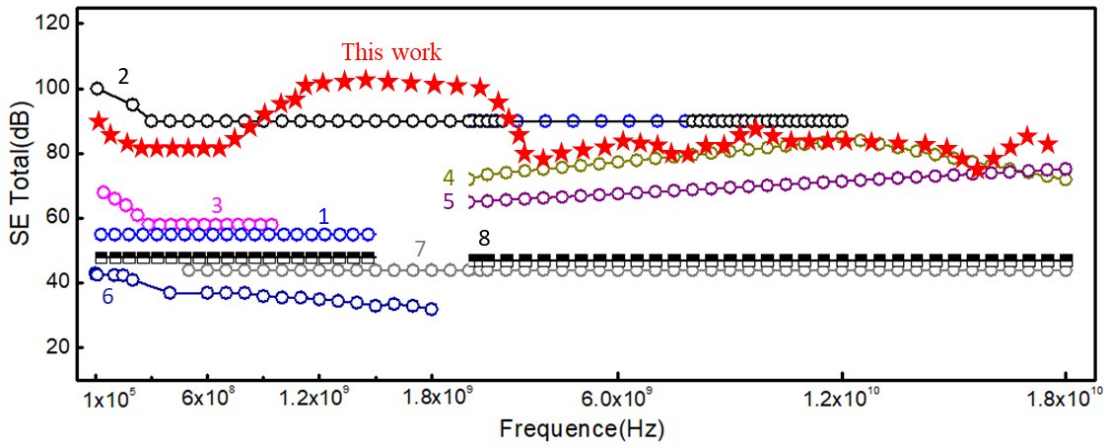

Figure S7. Comparison of the specific SE in the frequency from 100 KHz-18 GHz. The detailed information about shielding materials is listed in Table S2.

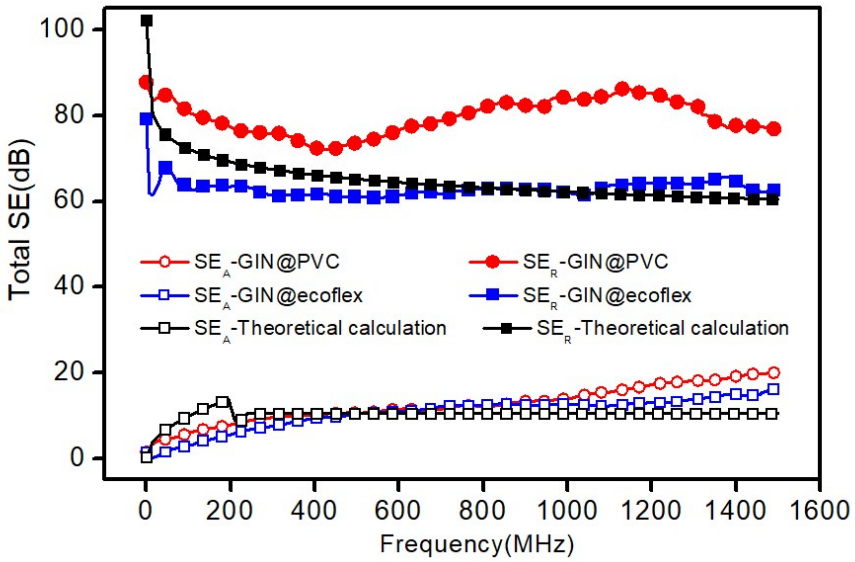

Figure S8. Experimental and theoretical SEA and SER of GIN@PVC and GIN@Ecoflex. The theoretical SE_A and SE_R was calculated by Simon formula.

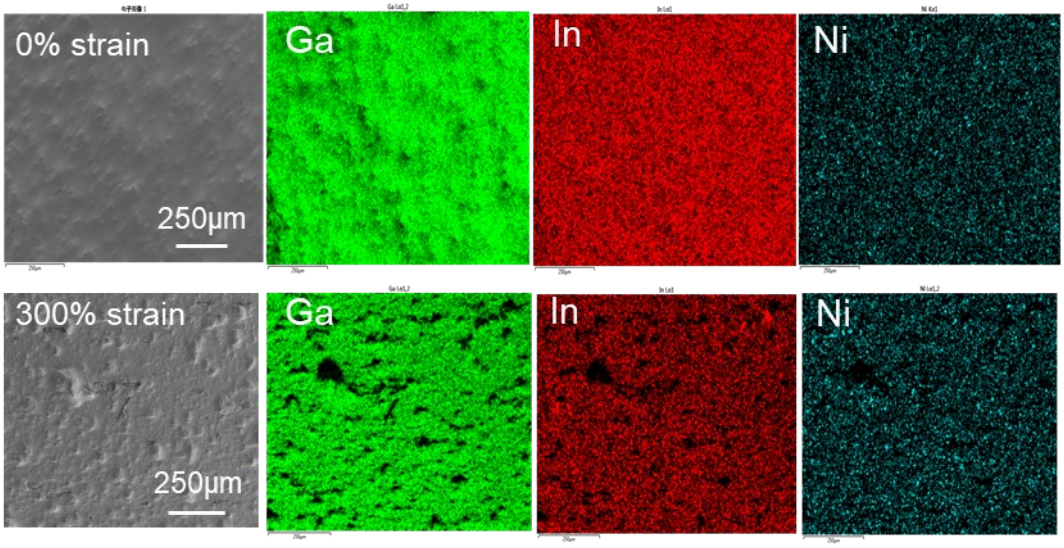

Figure S9. EDS shows the distribution of Ga,In and Ni, indicating the continuous conductive path during stretching.

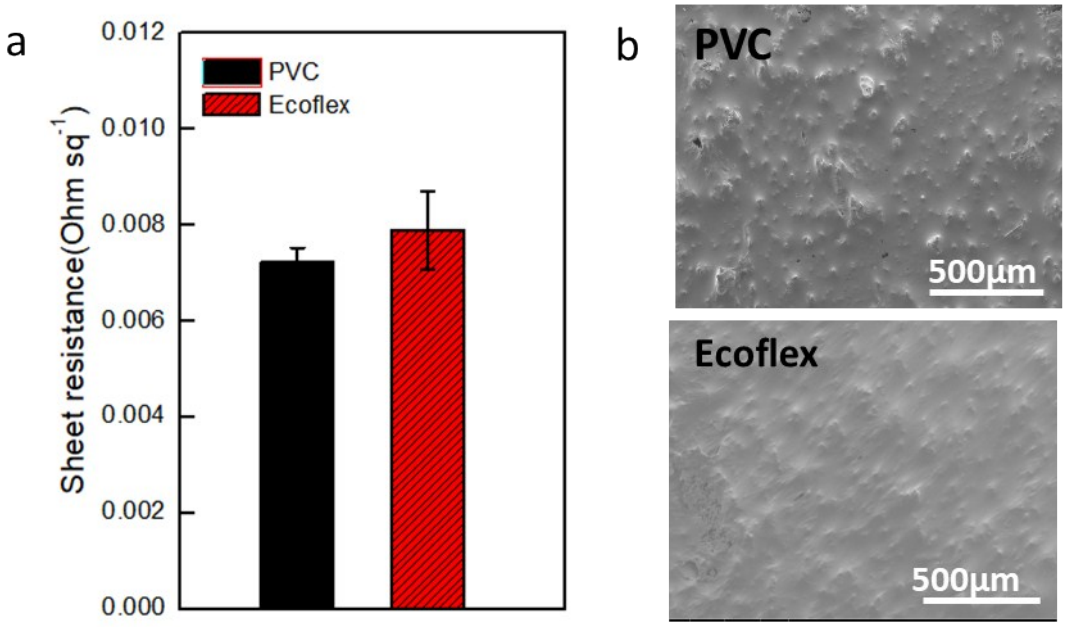

Figure S10. a) The sheet resistance of GIN@PVC and GIN@Ecoflex. b) SEM shows the surface of GIN painted PVC and Ecoflex.

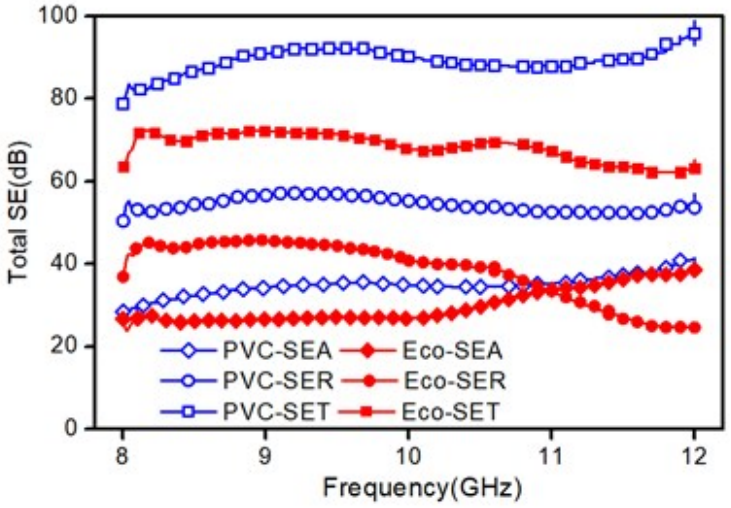

Figure S11. The SE_T, SE_A and SE_R of GIN@PVC and GIN@Ecoflex.

Table S1. Characteristic of various stretchable shielding materials

Fillers	Matrix	Thickness	Reference
Ag nanoparticle	Styrene-b-butadiene-b-styren	-	[42]
Ag nanowire	Dimethylsiloxane	-	[40]
CNT	Natural rubber	600 μm	[4]
CNT	Fluorinated rubber	200 μm	[48]
MWCNT	Polydimethylsiloxane	-	[41]
SWCNT	Butyl rubber	>1mm	[14]
PEDOT:PSS	Waterborne polyurethane	150 μm	[43]
Ni	EGaIn	~50 μm	This work

CNT, Carbon Nanotubes; SWCNT, Single-Walled Carbon Nanotubes; MWCNT, multiwalled Carbon Nanotubes; PEDOT:PSS, poly(3,4-ethylenedioxythiophene):polystyrenesulfonate)

Table S2. Characteristic of various shielding materials with broad shielding frequency range

Number	Shielding material	Substrate	Thickness	Frequency	Reference
1	Cu+carbon fiber	Pitch	32μm (Cu)	30MHz-1.5GHz; 2GHz-10GHz	[27]
2	Cu+Ag	Leather	0.6mm	10MHz-3GHz; 8GHz-12GHz	[28]
3	Ag	PET	0.93μm(Ag); 1.18mm (PET）	45MHz-1GHz	[18]
4	Nickel	Nylon	100μm	2-18GHz	[16]
5	Ni–P/Cu–Ni	Polyester fabric	--	2-18GHz	[30]
6	Ag	PET	--	10KHz-1.8GHz	[31]
7	Ag	Poly	0.2μm(Ag); 20μm (Poly）	500MHz-18GHz	[32]
8	MXenex	--	4μm	30MHz-1.5GHz	[15]
9	GIN	Any Substrates	~50μm	100KHz-18GHz	This work

Table S3. The relationship between frequency and skin depth of GIN.

Frequency	skin depth (μm)
100KHz	1118.99
1MHz	411.14
10MHz	130.01
100MHz	41.41
1GHz	13.00
1.5GHz	10.61
10GHz	4.11