End of use fly ash as an effective reinforcing filler in green polymer composites

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Supplementary Information

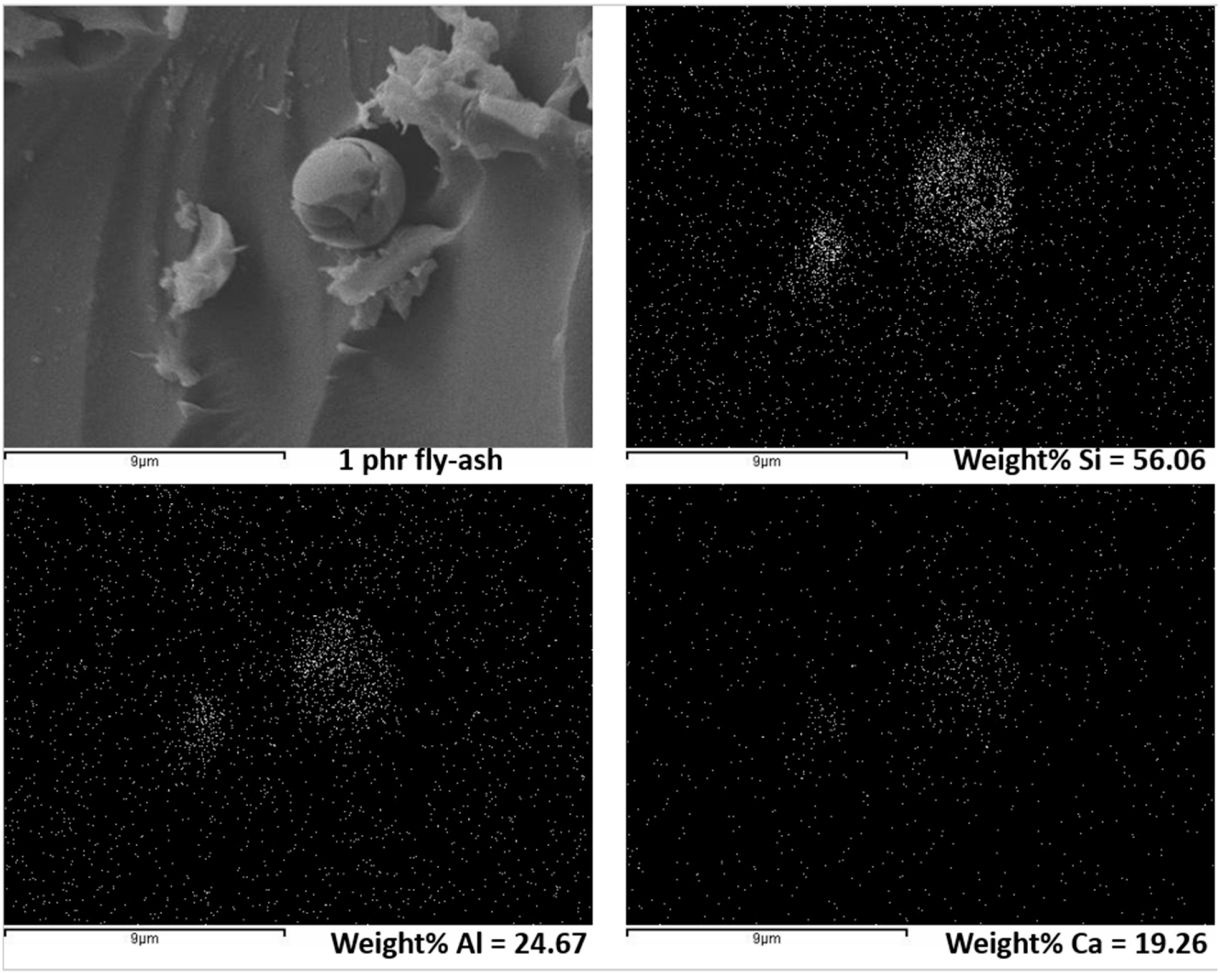


Figure S1. Energy-dispersive X-ray spectroscopy spectrum for the composite with 1 phr fly ash. (Mapping)

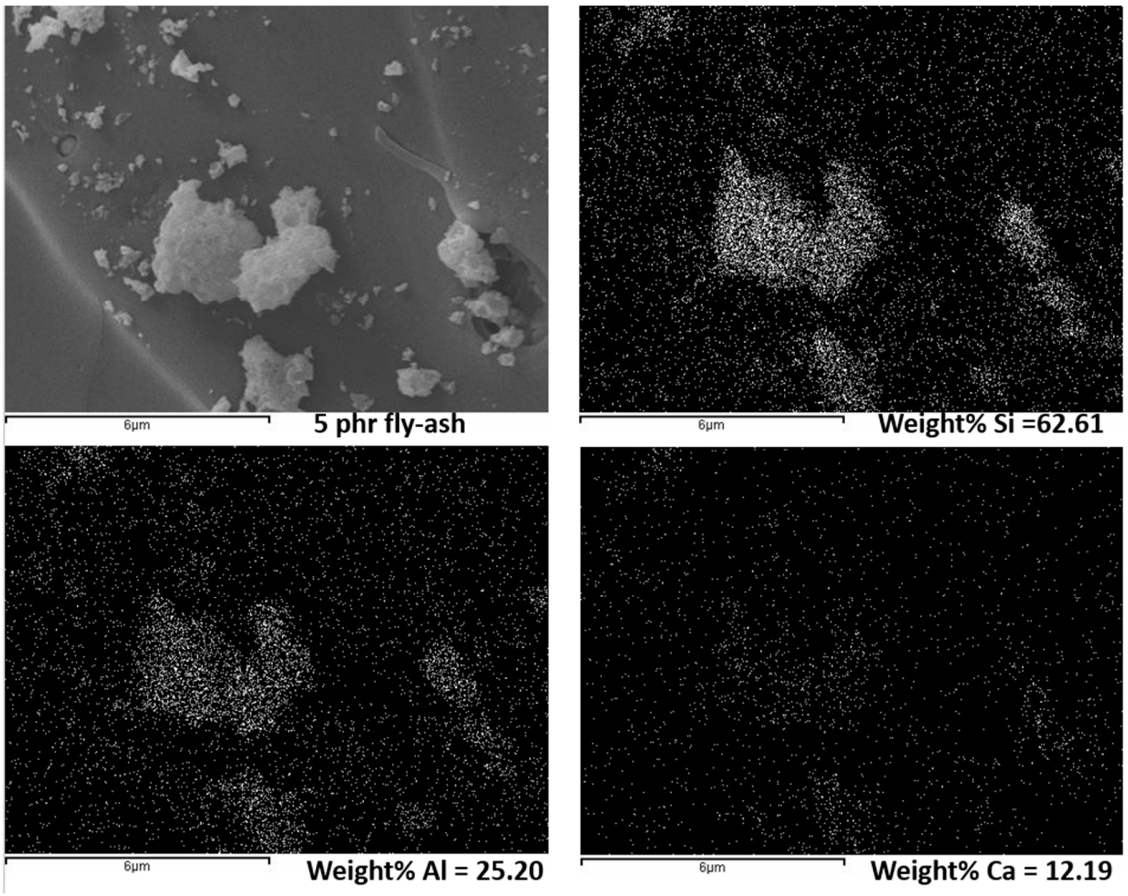
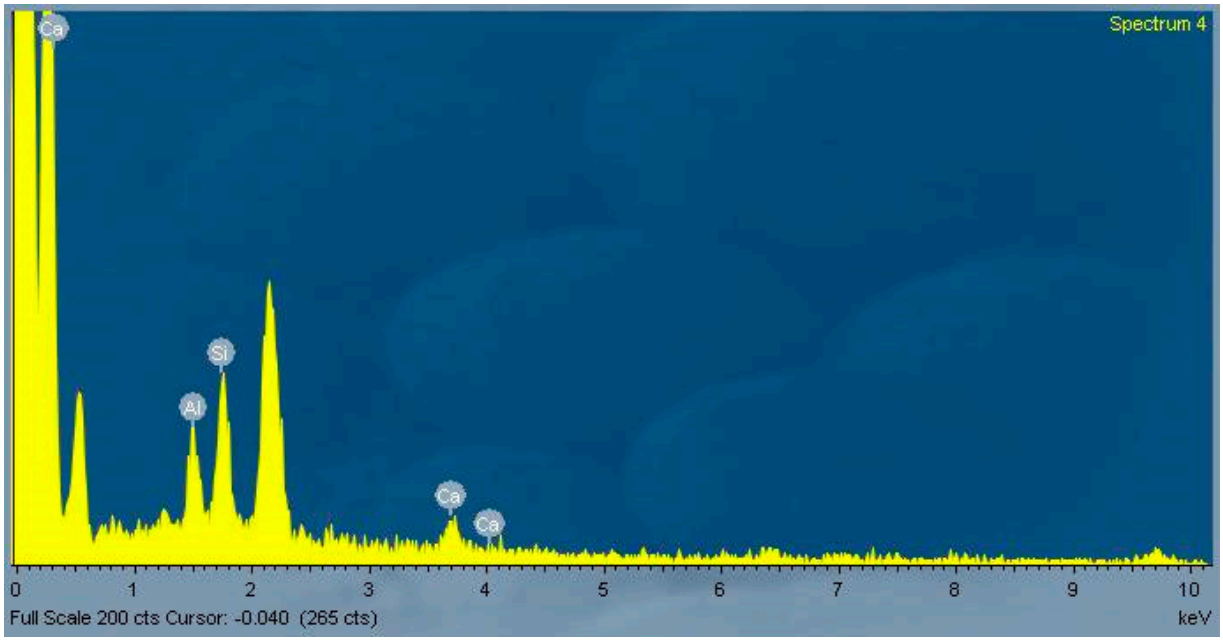
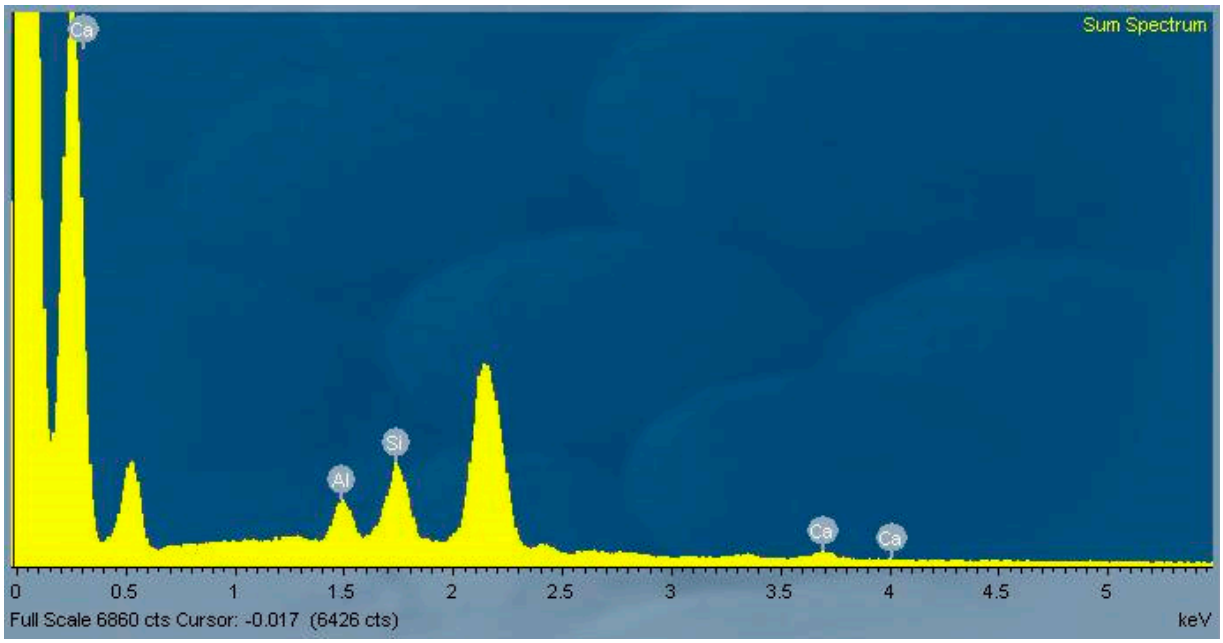


Figure S2. Energy-dispersive X-ray spectroscopy spectrum for the composite with 5 phr fly ash. (Mapping)



(a)



(b)

Figure S3. (a) Energy-dispersive X-ray spectroscopy spectrum for the composite with 1 phr fly ash and (b) 5 phr fly ash .

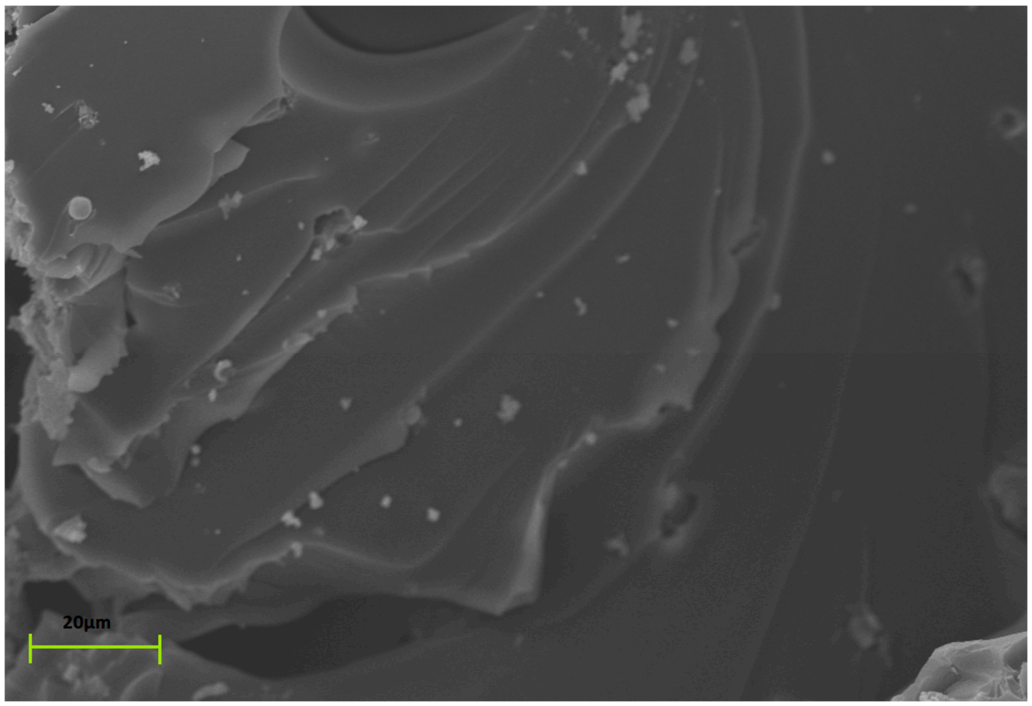
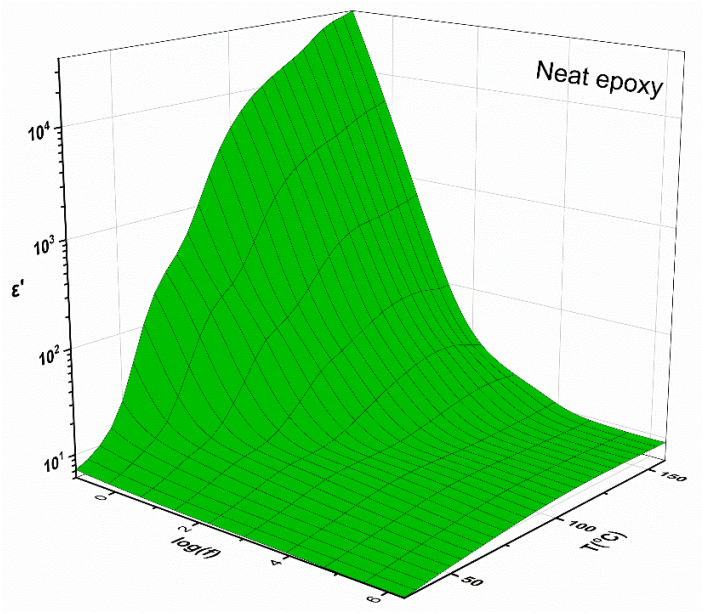
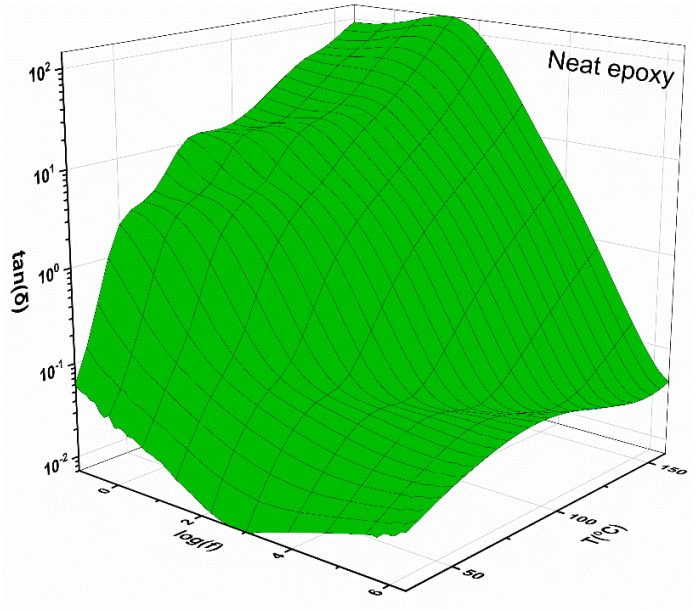


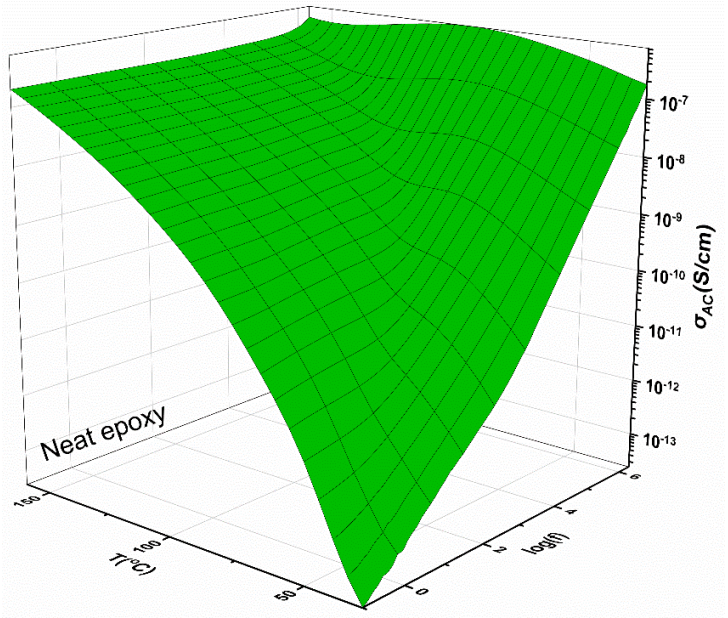
Figure S4. SEM image from the composite with 10 phr fly ash content, at a lower magnification.



(a)

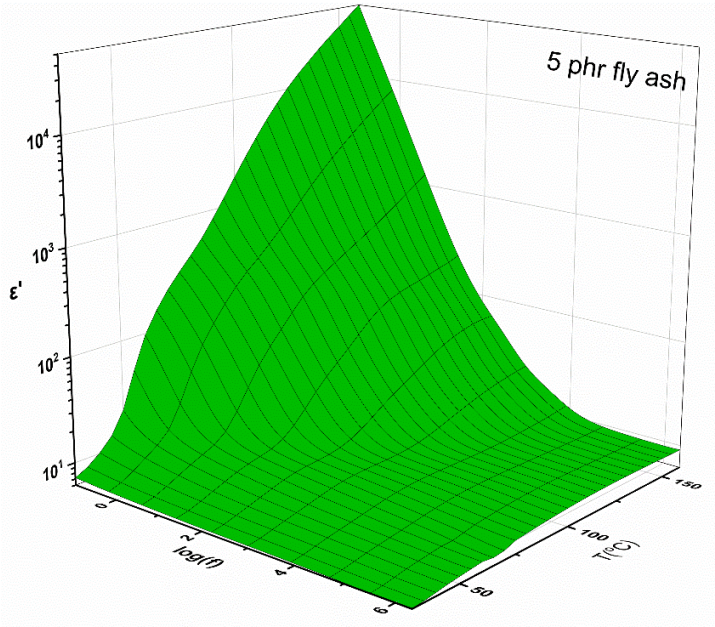


(b)

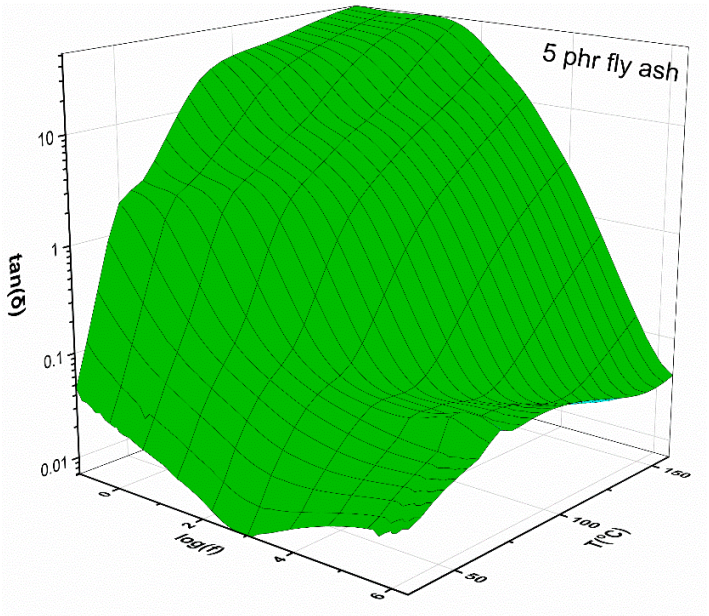


(c)

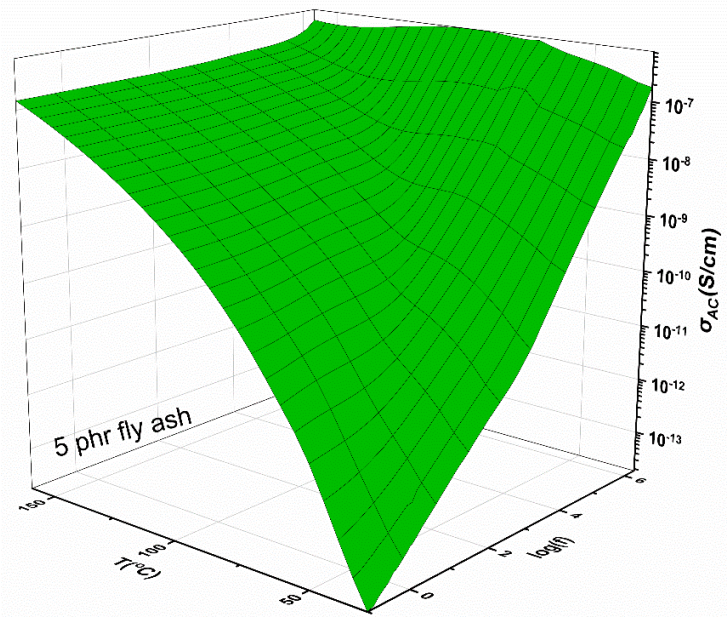
Figure S5. (a) Real part of dielectric permittivity, (b) loss tanδ, and (c) σ_{ac} as a function of frequency and temperature for the neat epoxy composite.


5 phr fly ash
ε'
10^4
10^3
10^2
10^1
log(f)
T(°C)
50
100
150

(a)


5 phr fly ash
tan(δ)
10
1
0.1
0.01
log(f)
T(°C)
50
100
150

(b)



(c)

Figure S6. (a) Real part of dielectric permittivity, (b) loss tanδ, and (c) σ_{ac} as a function of frequency and temperature for the the 5 phr fly ash/epoxy composite.

Table S1. Filler content in specimens,

Filler content in specimens (phr)	Weight %		
	Si	Al	Ca
1 phr fly-ash	56.06	24.67	19.26
5 phr fly-ash	62.61	25.20	12.19