Low-temperature Preparation of Core-shell SiC@C Nanospheres toward Electromagnetic Wave Absorption

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1.1 Characterization

Powder X-ray diffraction (XRD) pattern was obtained using a D8 advance X-ray diffractometer (Cu Kα radiation, 0.154 nm), which can be used to characterize the phase composition of the material. The surface morphology was obtained by scanning electron microscope (SEM, Hitachi, SU8100). The crystal plane information and core-shell structure were obtained by transmission electron microscope (TEM, Tecnai G2 F20 S-TWIN, USA) and the distribution of elements was analyzed by EDS. X-ray photoelectron spectroscopy (XPS) performed on an X-ray photoelectron spectroscope (K-Alpha, Thermo scientific, Waltham, USA), using Al-Kα radiation as the excitation source. The amount of graphene in the samples was estimated by a HITACHI STA 200 thermogravimetric analysis (TGA) instrument. Confocal Raman spectroscopy (Raman, Renishaw-invia, England) was used to test the graphitization and disorder degree of the material.

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Figure S1

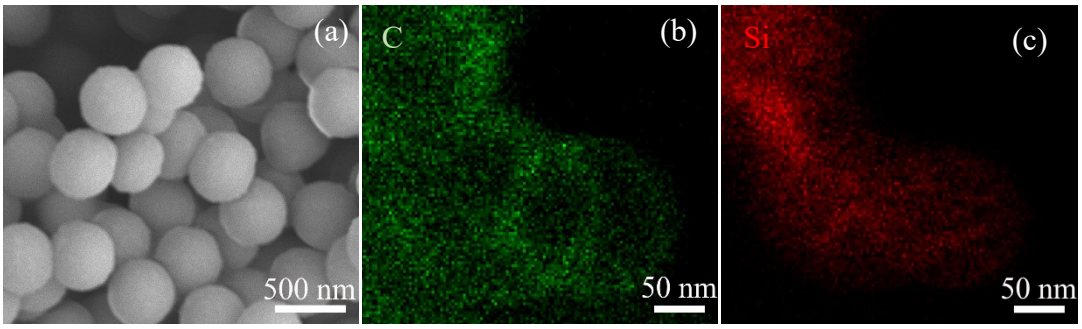

Figure S1 SEM image of SiO_2@C (a), and element mapping images of C and Si elements of SiC@C-700 (b, c).

Figure S2

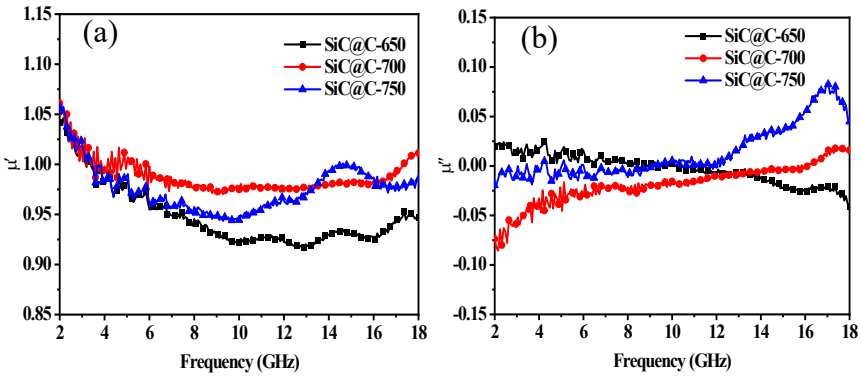

Figure S2 Real part (a) and imaginary part (b) of the permeability for SiC@C dispersed in paraffin with 15 wt%.

Figure S3

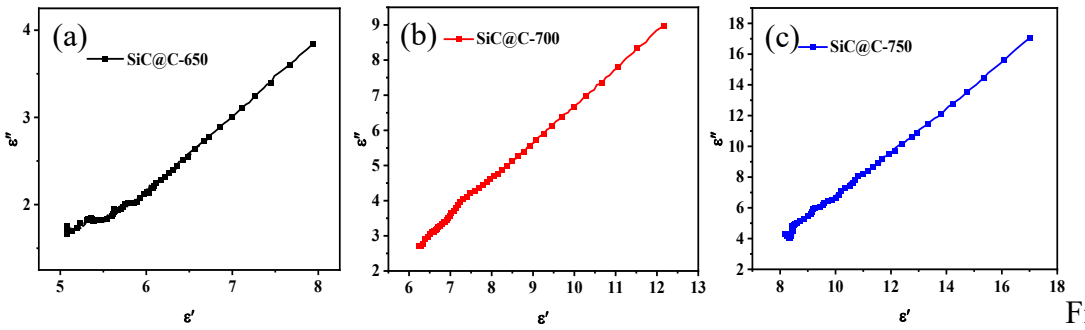

Figure S3 ε′-ε″ curves of SiC@C-650 (a), SiC@C-700 (b), and SiC@C-750 (c) dispersed in paraffin, respectively.

Table S1 EM wave absorption performances of the typical SiC-based spherical absorbers.

Absorber	d (mm)	Filling ratio (wt%)	RL_{min} (dB)	EAB_{max} (GHz)	Ref.
SiC@C@FeCo	2.0	30	-60.56	6.09	[S1]
SiC@MnO_2	1.8	35	-61.0	5.71	[S2]
SiC@Ni	4.2	50	-50.75	4.2	[S3]
SiC/C nanospheres	1.7	30	-41.34	4.01	[S4]
Ni/SiC@C	5.0	50	-25.87	1.86	[S5]
SiC@C@PANI	1.88	20	-28.22	5.61	[S6]
SiC@WS_2	2.1	30	-50.52	4.60	[S7]
Fe_3Si@SiC@C	1.4	30	-20	4.24	[S8]
SiC@Ti_3SiC_2	2.3	60	-68.59	5.6	[S9]
SiC@Ag	1.6	50	-36.3	4.99	[S10]
SiC@SiO_2	1.85	30	-45.53	5.52	[S11]
SiC@C-650	2.24	15	-30.0	3.76	**This work**
SiC@C-700	2.08		-54.38	5.6	
SiC@C-750	1.76		-17.59	5.12	

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