

Supporting Information

A novel three-dimensional Fe₃SnC/C hybrid nanofiber absorber for lightweight and highly-efficient microwave absorption

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Experimental Section

Preparation of materials: 3D Fe₃SnC/C HNFs were fabricated through electrospinning method followed by stabilization in air and carbonization in Ar. In a typical process, 2.3451 g of Fe(NO₃)₃·9H₂O and 0.6549 g of SnCl₂·2H₂O were dissolved together in a DMF solution of 2 g of polyvinylpyrrolidone (PVP, Mw≈1300000, Aldrich). The obtained solution was then transferred to a syringe for electrospinning using a TL-01 electrospinning apparatus at an operating voltage of 18 kV, a spinning distance of 15 cm and a feeding rate of 0.5 mL/h. Finally, the collected precursor fibers after drying overnight at 80 °C were calcined at 250 °C for 2 h in air and subsequently carbonized at 700 °C for 3 h under Ar atmosphere to yield Fe₃SnC/C HNFs. For comparison, pure carbon NFs were also obtained in the similar route without Fe(NO₃)₃·9H₂O and SnCl₂·2H₂O.

Characterization: The phase composition, morphology and microstructure of the sample were characterized by using X-ray diffractometer (XRD, Bruker D8 advance), field-emission scanning electron microscopy (FE-SEM, ZEISS Merlin Compact), and transmission electron microscopy (TEM, JEOL JEM-2100), respectively. Thermogravimetric analysis (TGA) was conducted on a TGA apparatus (Shimadzu, DTG-60H) in air. The room temperature magnetic properties were investigated using a HH-20 vibration sample magnetometer (VSM) with an applied external field of 1.5 T. EM parameters of the paraffin-based toroidal composite filled with 20 wt% Fe₃SnC/C HNFs were performed on an Agilent PNA N5224A vector network analyzer over 2–18 GHz using the

coaxial-line method. The composite was pressed into toroidal-shaped sample before test ($\Phi_{out} = 7.00$ mm, $\Phi_{in} = 3.04$ mm).

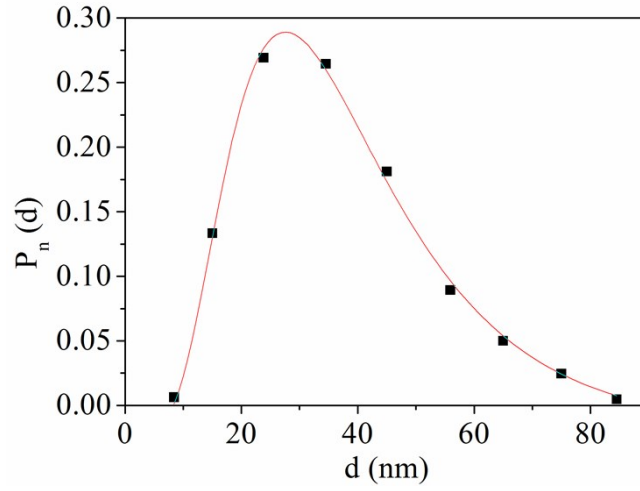


Figure S1. Number average particle size distribution of Fe₃SnC particles.

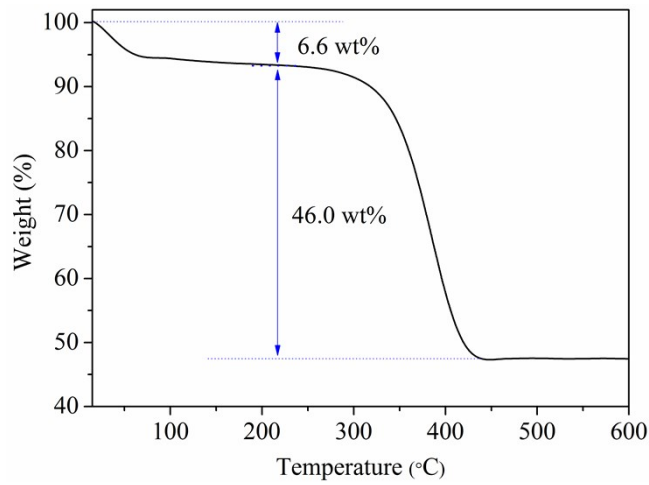


Figure S2. TG curve of Fe₃SnC/C HNFs.

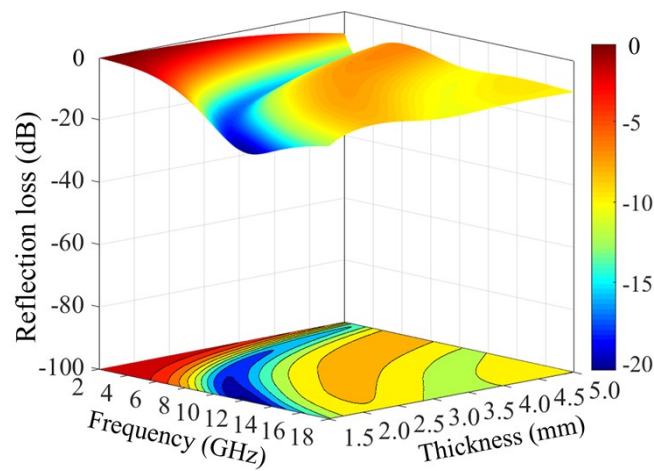


Figure S3. 3D representation of RL for CNFs.

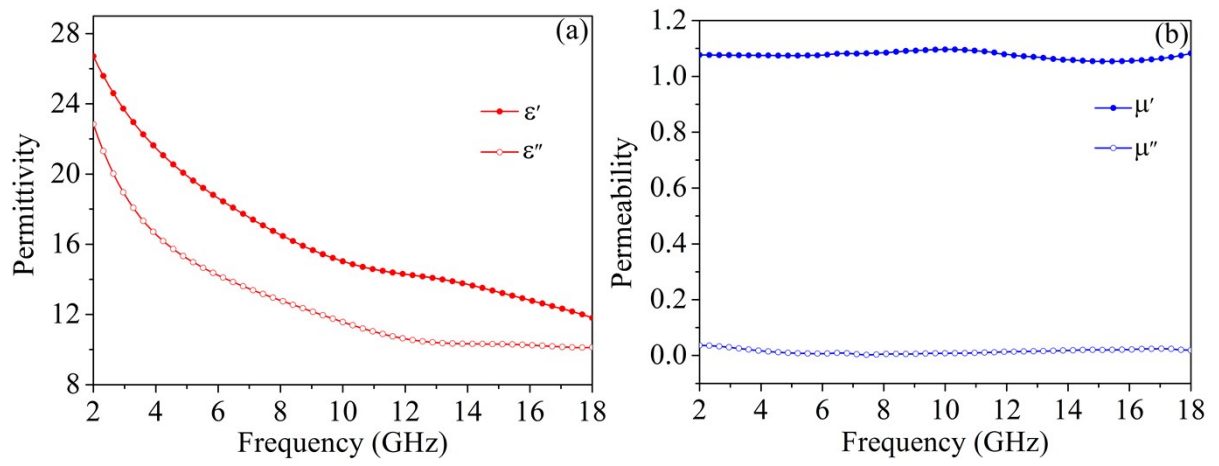


Figure S4. (a) Relative complex permittivity and (b) complex permeability of CNFs.

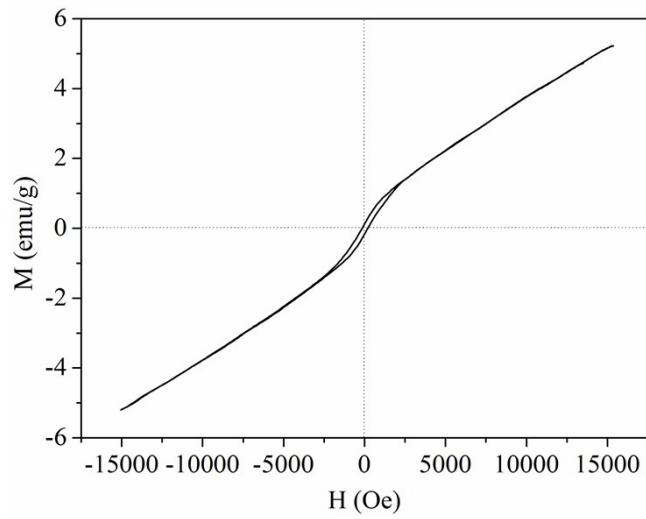


Figure S5. Room-temperature hysteresis loop of Fe₃SnC/C HNFs.