Support information

Enhanced electromagnetic wave absorption performance of a novel carbon-coated Fe_3Si nanoparticles in the amorphous SiCO ceramics matrix

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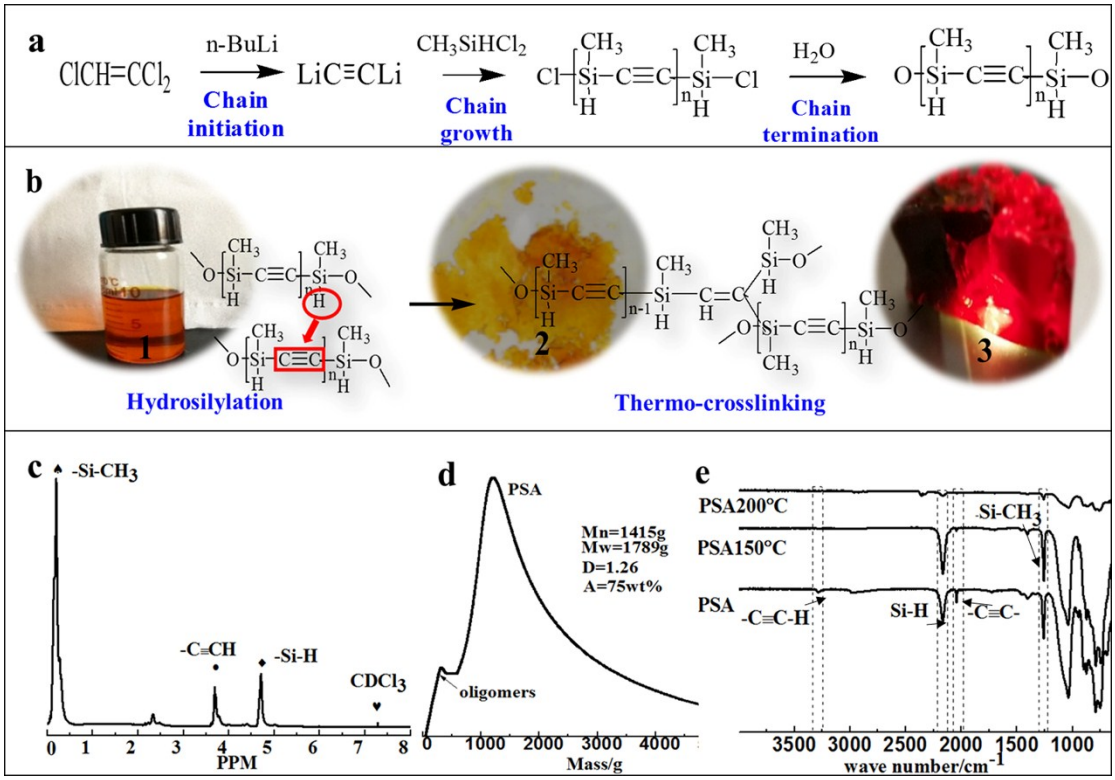

Fig S1. The detailed synthetic process and characterizations of PSA. (a) the synthetic process, (b) the crosslinking process, (c) H-NMR, (d) GPC, (e) FTIR.

The synthesis of PSA is mainly based on the dechlorination between LiC≡CLi and CH_3SiHCl_2. The reaction formula of PSA is described in Fig S1a. Obviously, ideal PSA precursor is a macromolecular weight polymer with the repetitive element -Si-C≡C- bond. Due to the high activity of the -Si-H bond and the -C≡C- bond, the thermo-crosslinking could take place by the hydrosilylation in Fig S1b. As shown in Fig S1c, the peak at 4.6 ppm in H-NMR is from the -Si-H bond, while the peak at 0.4~0.7 ppm is attributed to the -Si-CH_3 bond. GPC analysis demonstrates the molecular weight distribution of the PSA. As shown in Fig S1d, the M_n of the PSA resin is about 1415 g/mol, M_w is about 1789 g/mol, and the ID (index of polydispersity) is 1.26. As for the PSA, there are three typical peaks shown in the Fig S1e, the peak at 2165 cm^{-1} is attributed to the -Si-H bond, the peak at 2045 cm^{-1} is on account of -C≡C- bond stretching vibration, and 1260 cm^{-1} is due to Si-CH_3 vibration.

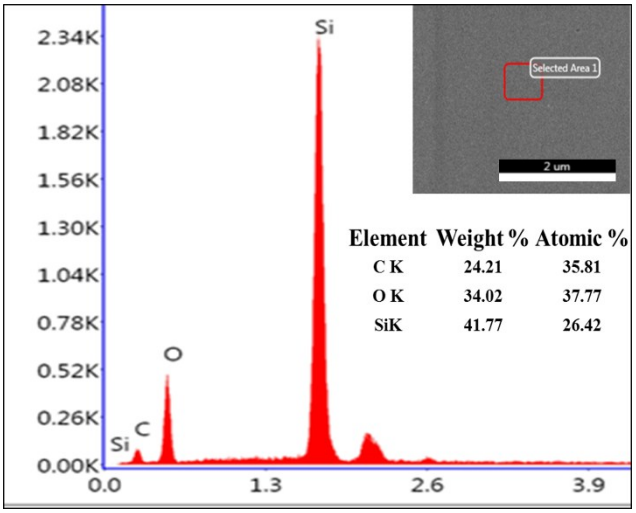

Fig S2. The EDX patterns of the PSA at 1000°C

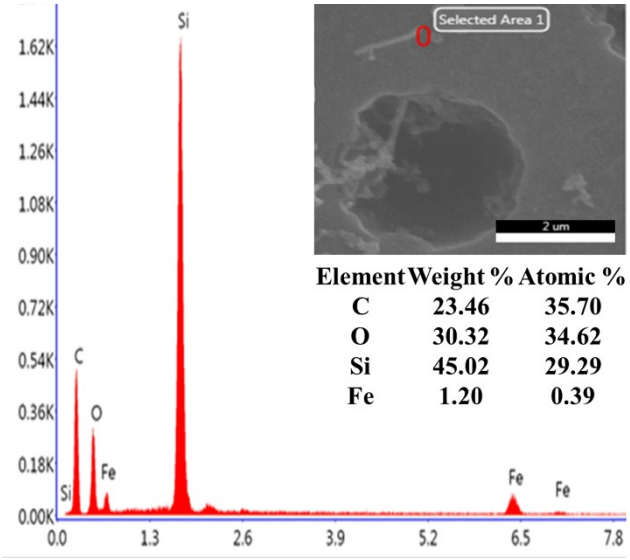

Fig S3. The EDX patterns of the sample Fe-1.

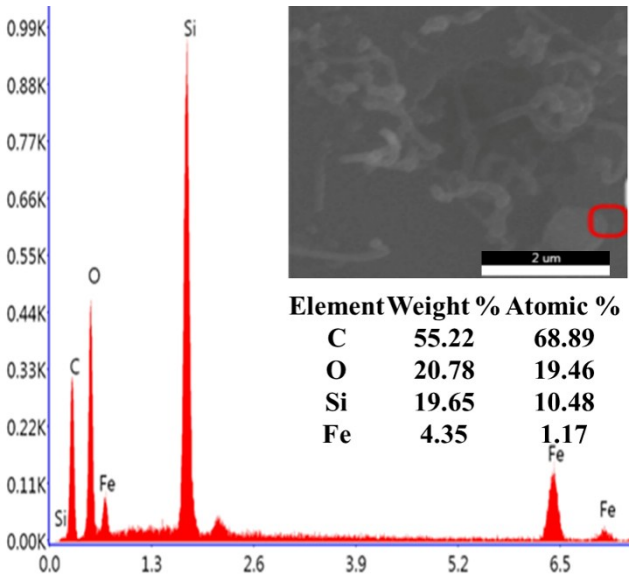

Fig S4. The EDX patterns of the sample Fe-2.

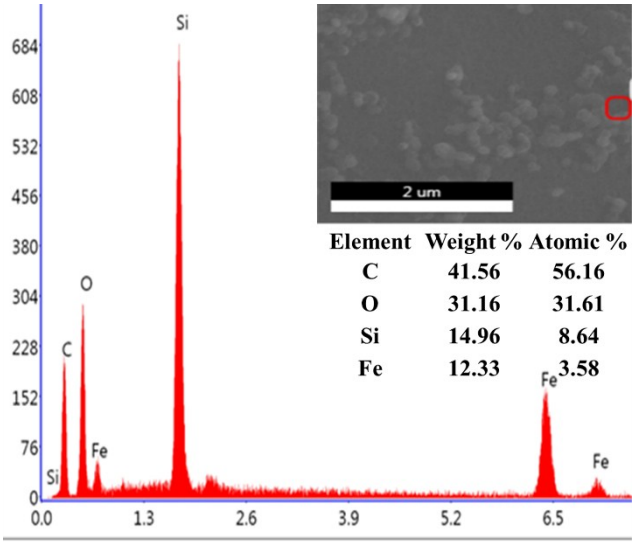

Fig S5. The EDX patterns of the sample Fe-3.

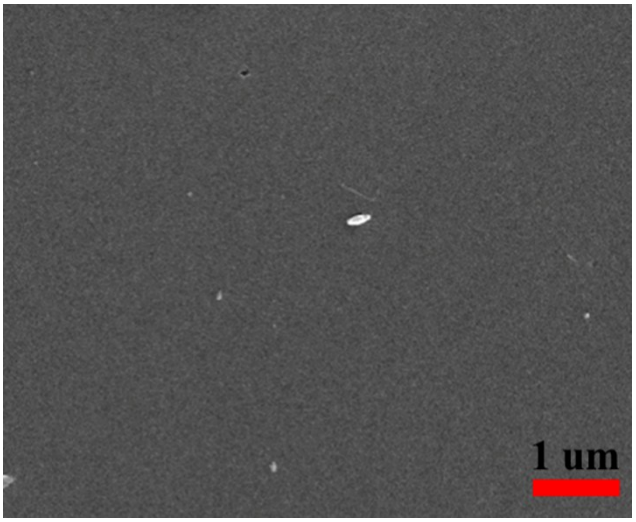

Fig S6. SEM of PSA at 1000°C.

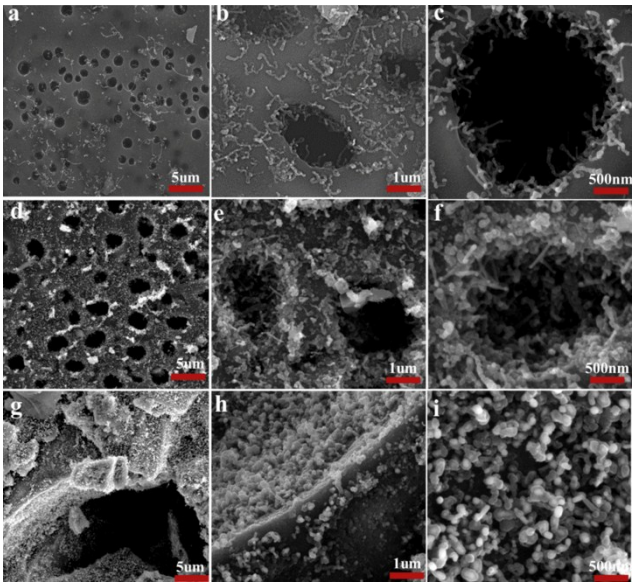

Fig.S7. SEM of samples. (a, b, and c) Fe-1, (d, e, and f) Fe-2, (g, h, and i) Fe-3.

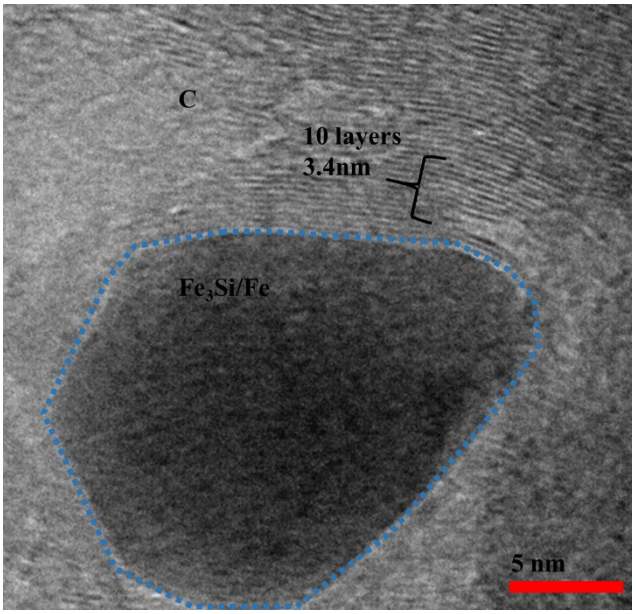

Fig S8. TEM of the single carbon sphere.

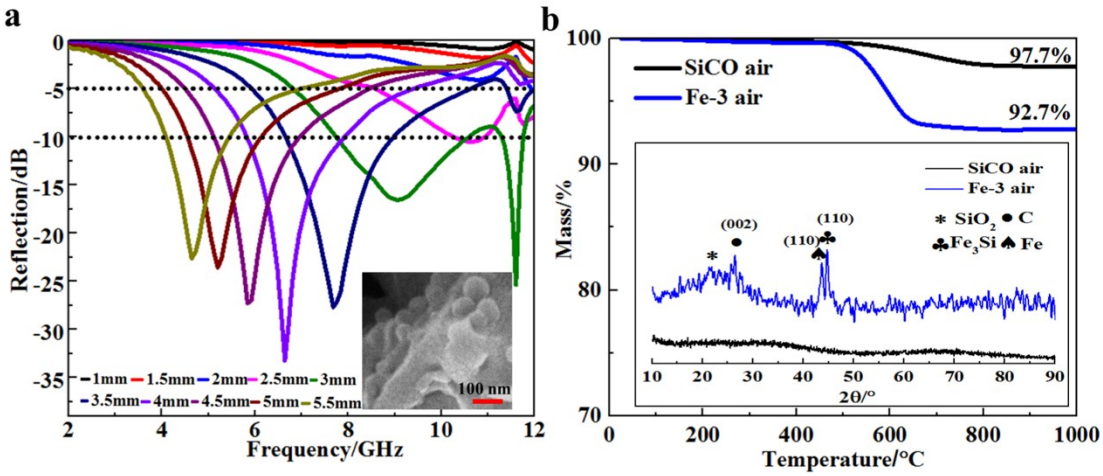

Fig S9.The high temperature stability of Fe-3. (a) the reflection loss and the morphology of the sample Fe-3, (b) the TG curves and XRD patterns of Fe-3.