Electronic Supplementary Information

Carbon Coated Co/SiC Nanocomposite with High-Performance Microwave Absorption

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Figure S1. SEM image of warm-like SiC.

Figure S2. Co$_{2p}$ XPS spectra of Co$_3$O$_4$/SiC (A) and Carbon-Co/SiC (B).

Figure S2 shows the Co$_{2p}$ spectra of Co$_3$O$_4$/SiC and Carbon-Co/SiC composite. It can be seen from Figure S2A that the the 2p$_{3/2}$ and 2p$_{1/2}$ spin-orbit lines of Co are located at 780.9 eV and 796.8 eV, respectively, with two shake-up satellite peaks located at ~6 eV above the main peaks. The spin-orbit splitting of Co$_{2p}$ is 15.9 eV. These characteristics indicating that the Co component exists as Co$_3$O$_4$. The similar spectra are also observed in Co$_3$O$_4$ thin film$^1$ and Co3O4/ZnO Nanowire.$^2$ The prominent shake-up satellite appears at 786.7 eV, suggesting that most of the cobalt is in a high-spin form. Normally, most high-spin cobalt oxides are believed to be divalent. However, it has been demonstrated by Brown et al$^3$ that the Co(III) atoms also can
have such high-spin state.

From Figure S2B, it can be seen that the $2p_{3/2}$ and $2p_{1/2}$ spin-orbit lines of Co$_{2p}$ are located at 777.8 eV and 792.8 eV, respectively. The spin-orbit splitting of Co$_{2p}$ is 15 eV. These characteristics suggest that the Co exists as metallic Co in Carbon-Co/SiC composite.$^4$

![Dielectric polarization](image1)

Figure S3. Cole–Cole plot of Carbon-Co/SiC.

From Figure S3, it can be seen that there is a cole-cole semicircle when $\varepsilon'$ values are in the range of 7-9. The corresponding frequency range is 9-18 GHz.

![Tangent loss curves](image2)

Figure S4. Tangent loss curves of permittivity (A) and permeability (B) of the composites.
References


