Electronic Supplementary Information

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

Song Xie,[a,b] Xiao-Ning Guo, [a] Guo-Qiang Jin,[a] and Xiang-Yun Guo[a,*]

[a] State Key Laboratory of Coal Conversion, Institute of Coal Chemistry, Taiyuan 030001, PR China

[b] University of Chinese Academy of Sciences, Beijing 100039, PR China

[*] Corresponding author. Tel.: +86 351 4065282; fax: +86 351 4050320.

Email address: xyguo@sxicc.ac.cn (X-Y. Guo).

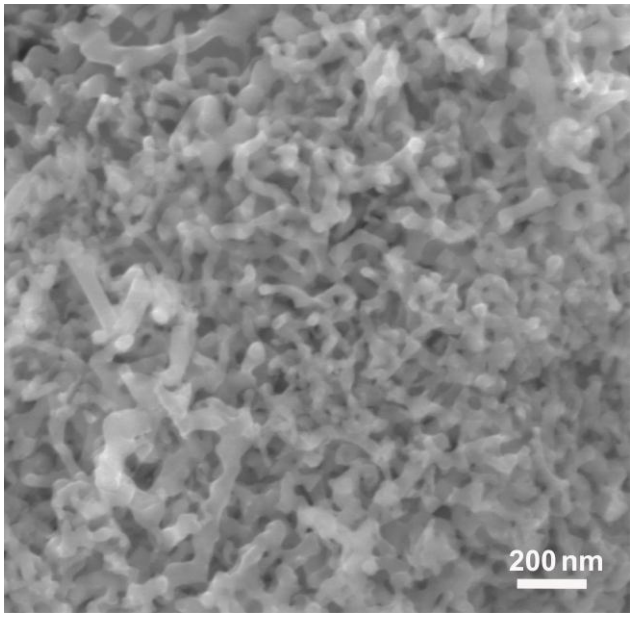

Figure S1. SEM image of warm-like SiC.

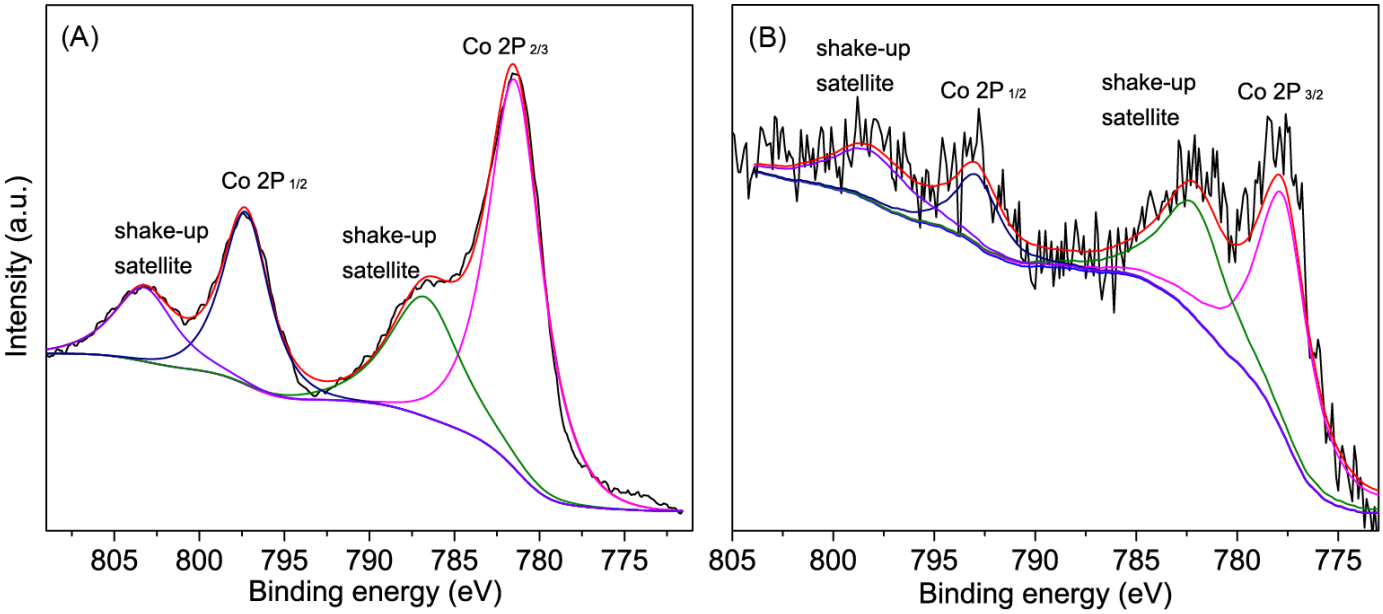

Figure S2. Co_{2p} XPS spectra of Co_3O_4/SiC (A) and Carbon-Co/SiC (B).

Figure S2 shows the Co_{2p} spectra of Co_3O_4/SiC and Carbon-Co/SiC composite. It can be seen from Figure S2A that the the $2p_{2/3}$ and $2p_{1/2}$ spin-obit 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_3O_4. The similar spectra are also observed in Co_3O_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 $2p_{2/3}$ and $2p_{1/2}$ spin-obit 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]

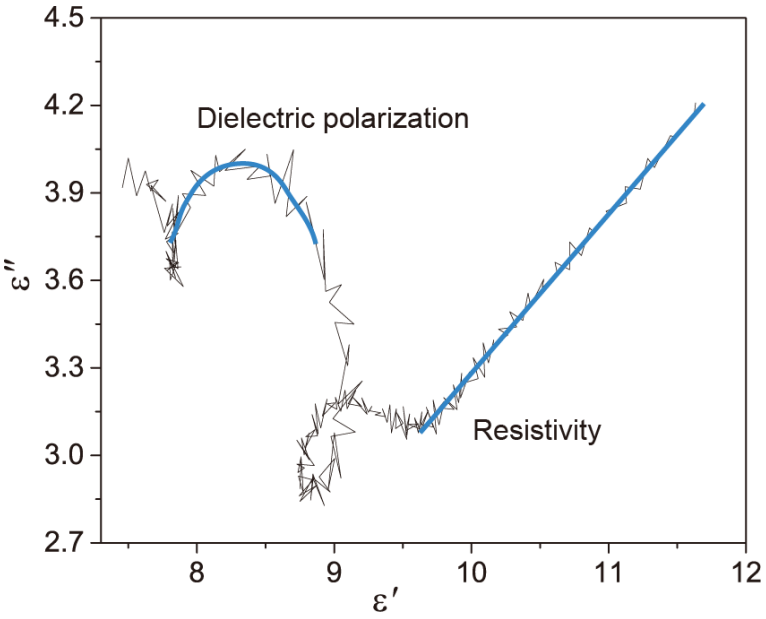

Figure S3. Cole−Cole plot of Carbon-Co/SiC.

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

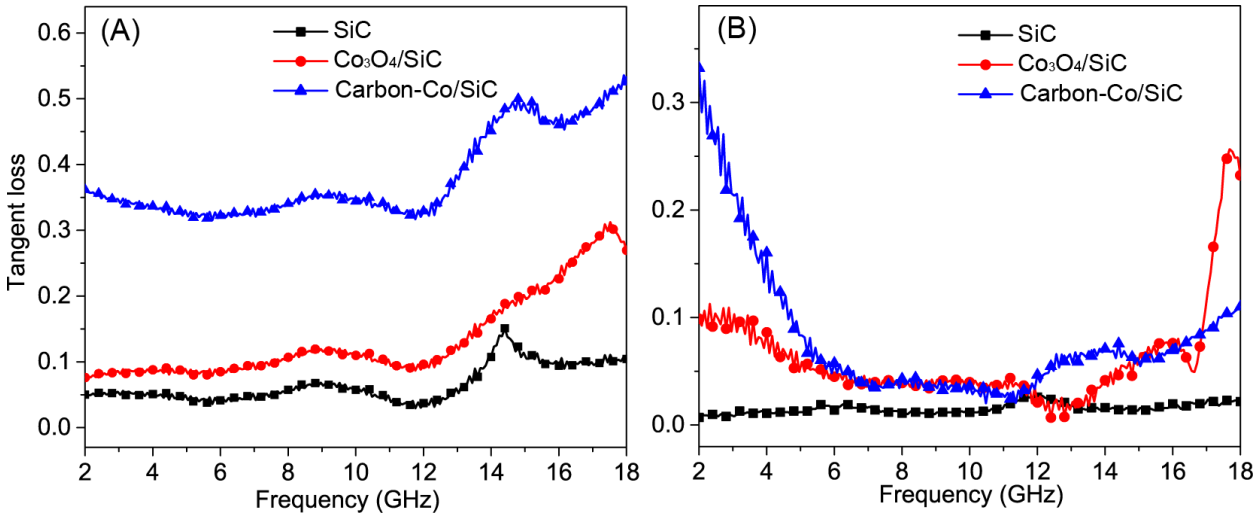

Figure S4. Tangent loss curves of permittivity (A) and permeability (B) of the composites.

References

1. M. Burriel, G. Garcia, J. Santiso, A. Abrutis, Z. Saltyte and A. Figueras, *Chem Vapor Depos*, 2005, **11**, 106-111.
2. Y. Tak and K. Yong, *J Phys Chem C*, 2008, **112**, 74-79.
3. N. S. Mcintyre, D. D. Johnston, L. L. Coatsworth, R. D. Davidson and J. R. Brown, *Surf Interface Anal*, 1990, **15**, 265-272.
4. B. J. Tan, K. J. Klabunde and P. M. A. Sherwood, *J Am Chem Soc*, 1991, **113**, 855-861.