Soft Science

Supplementary Materials

Frequency-thickness normalized electromagnetic parameter design for broadband electromagnetic wave absorption in FeCoCu alloy foams

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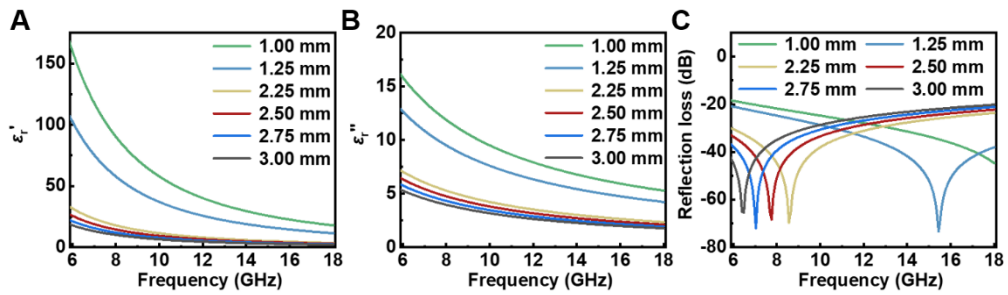
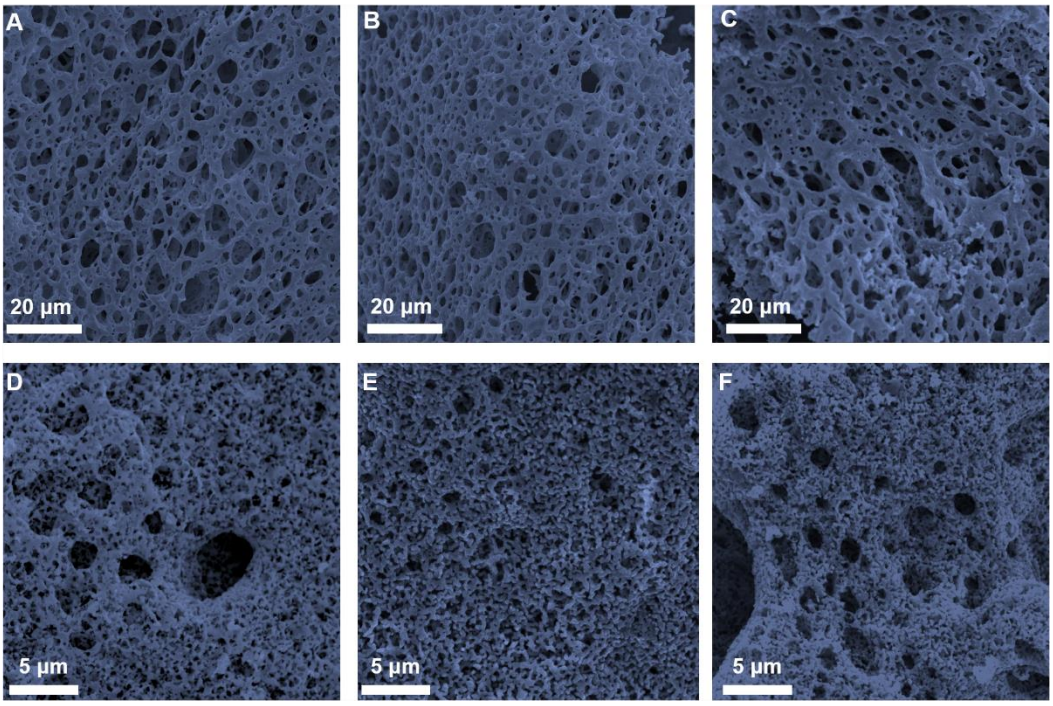
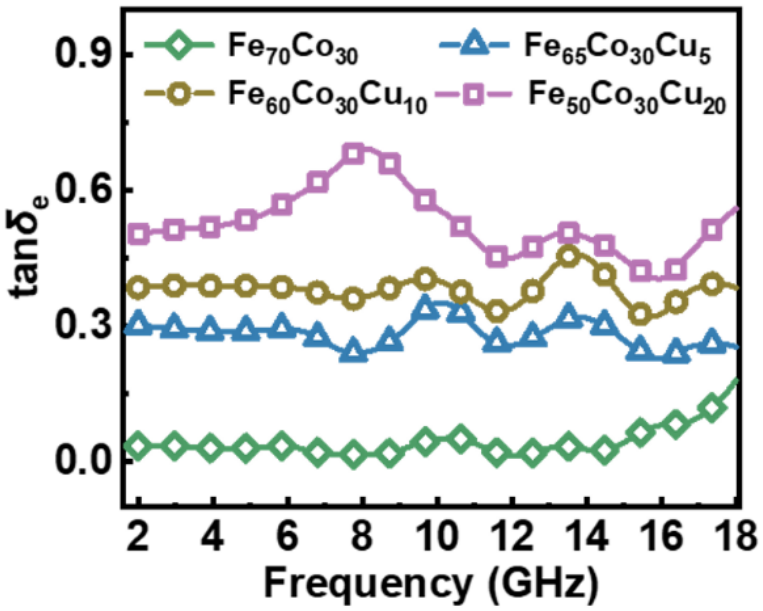


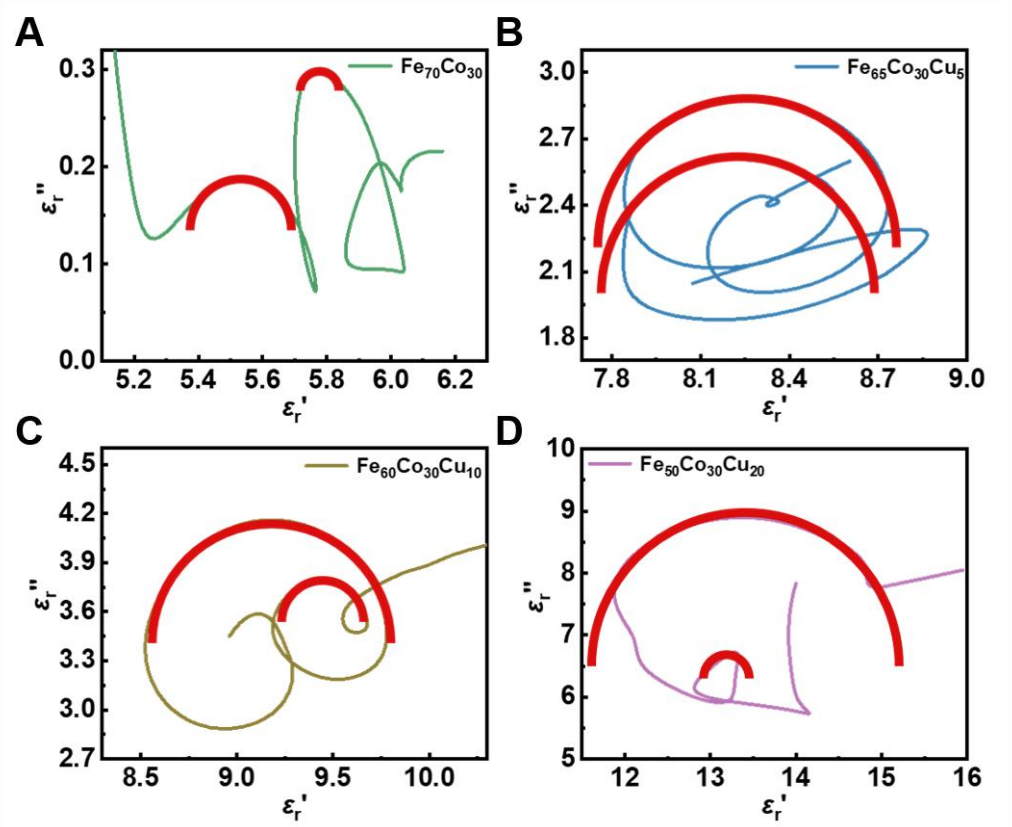
Supplementary Figure 1. Verification of the universality of the proposed permittivity–frequency–thickness relationship over an extended thickness range. Calculated (A) ε_r', and (B) ε_r'' as a function of frequency for thicknesses ranging from 1.00 to 3.00 mm. (C) RL curves derived from the constructed permittivity relationships.



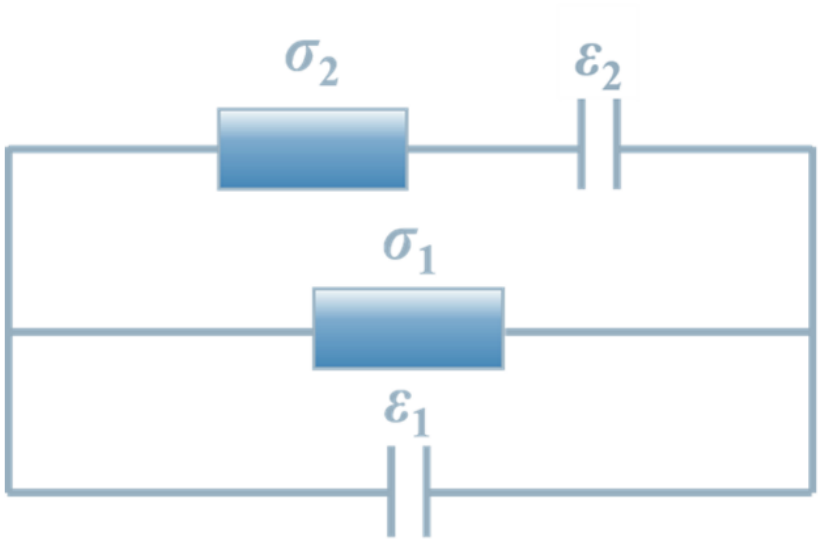
Supplementary Figure 2. Morphological comparison of FeCoCu oxide precursors and corresponding reduced alloys with different Cu contents. SEM images of (A) $Fe_{70}Co_{30}$ oxide, (B) $Fe_{60}Co_{30}Cu_{10}$ oxide, (C) $Fe_{50}Co_{30}Cu_{20}$ precursors. SEM images of reduced (D) $Fe_{70}Co_{30}$, (E) $Fe_{60}Co_{30}Cu_{10}$, and (F) $Fe_{50}Co_{30}Cu_{20}$ alloys.



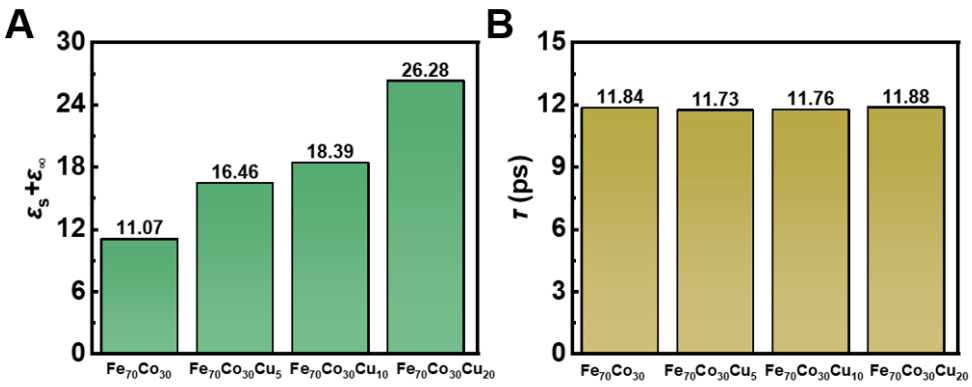
Supplementary Figure 3. tanδ_e values of FeCoCu foams with different Cu contents.



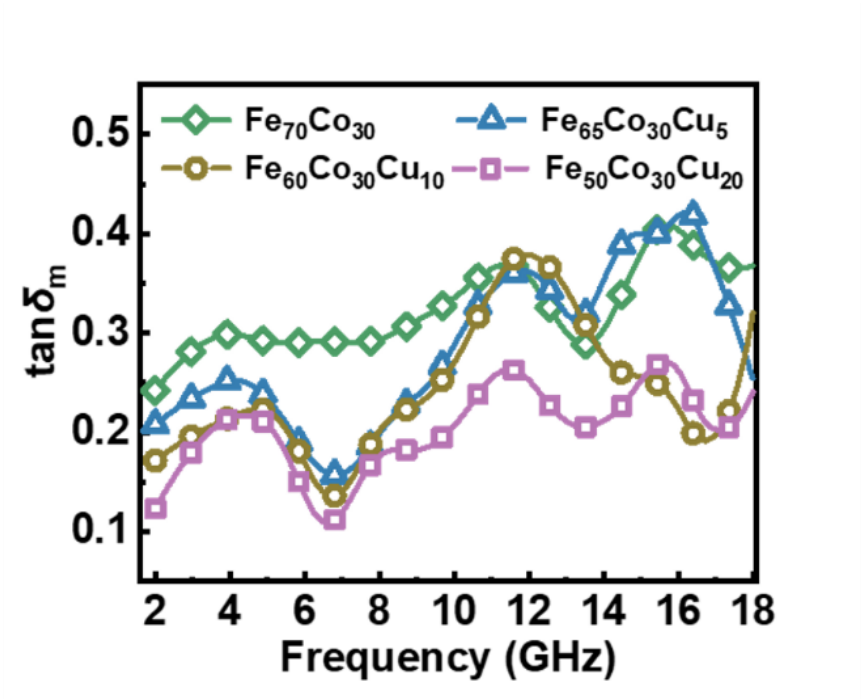
Supplementary Figure 4. Cole–Cole plots of FeCoCu foams with different Cu contents. Cole-Cole plots of (A) $Fe_{70}Co_{30}$, (B) $Fe_{65}Co_{30}Cu_5$, (C) $Fe_{60}Co_{30}Cu_{10}$ and (D) $Fe_{50}Co_{30}Cu_{20}$. The red solid lines indicate the fitted dominant Debye relaxation arcs used to extract the effective relaxation parameters.



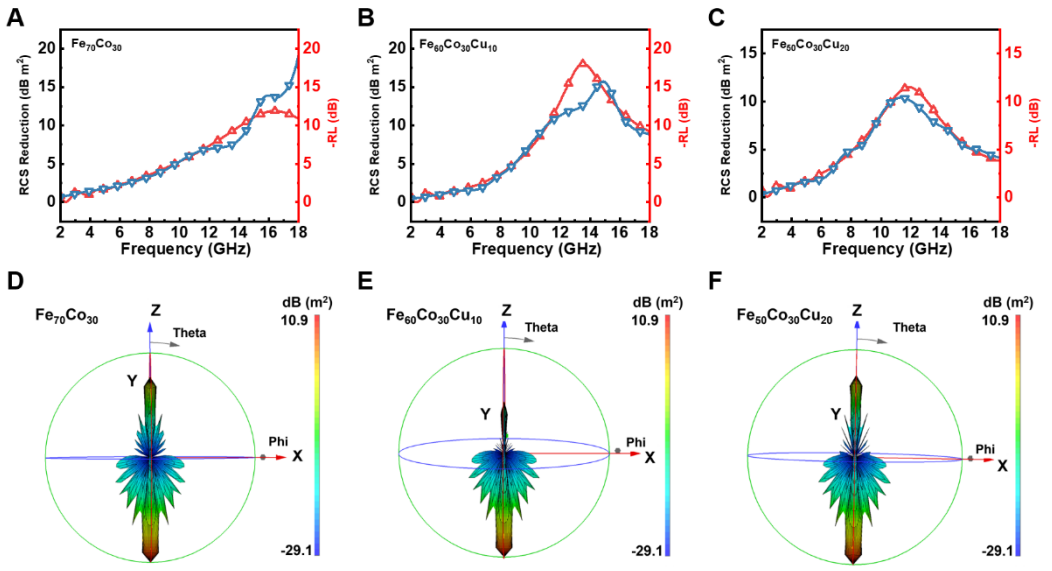
Supplementary Figure 5. Schematic diagram of the equivalent circuit for dielectric loss.



Supplementary Figure 6. (A) $\varepsilon_s + \varepsilon_\infty$ values, and (B) τ values of FeCoCu foams with different Cu contents.



Supplementary Figure 7. $\tan\delta_m$ values of FeCoCu foams with different Cu contents.



Supplementary Figure 8. RCS reduction, -RL and angular scattering characteristics of FeCoCu-coated PEC structures. RCS reduction curves and corresponding −RL curves of (A) $Fe_{70}Co_{30}$, (B) $Fe_{60}Co_{30}Cu_{10}$, and (C) $Fe_{50}Co_{30}Cu_{20}$ coated on PEC layers, respectively. Three-dimensional RCS patterns of PEC layers coated with (D) $Fe_{70}Co_{30}$, (E) $Fe_{60}Co_{30}Cu_{10}$, and (F) $Fe_{50}Co_{30}Cu_{20}$, respectively.