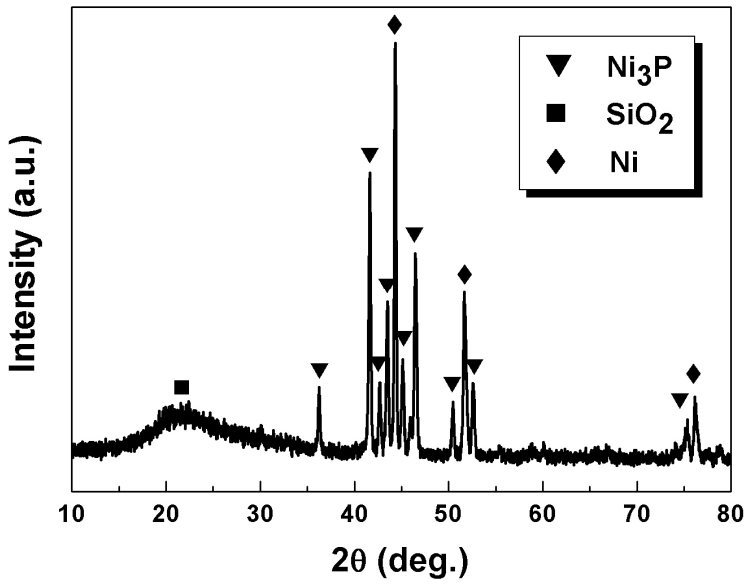
Supplementary Information for

Facile Aqueous Synthesis and Electromagnetic Properties of Novel 3D Urchin-like Glass/Ni-Ni_3P/$Co_2P_2O_7$ Core/Shell/Shell Composite Hollow Structures

Figure S1. XRD pattern of the HGS/Ni-Ni_3P core/shell composite hollow spheres obtained after heat treatment at 600℃ for 1.5h (without the $Co_2P_2O_7$ shell).



The heat treatment of the core/shell composite spheres obtained after Ni-P plating on HGS (only Ni-P shell, without the precursor layer) has also been carried out. Shown in Figure S1 is the XRD pattern of the core/shell products obtained after calcinating of the HGS/Ni-P core/shell composite hollow spheres. The narrow sharp peaks suggest the crystalline nature of the shell layer. All the reflections can be perfectly index to face-centered cubic (fcc) nickel (JCPDS 01-1260) and Ni_3P (JCPDS 34-0501), which confirms that the metallic nickel and Ni_3P alloy phases in the shell layer of the final products are both yielded from the original Ni-P shell.

Figure S2. SEM images of the composite spheres before heat treatment at different magnifications. The scale bars in the inset of panel (b) presents 500nm.

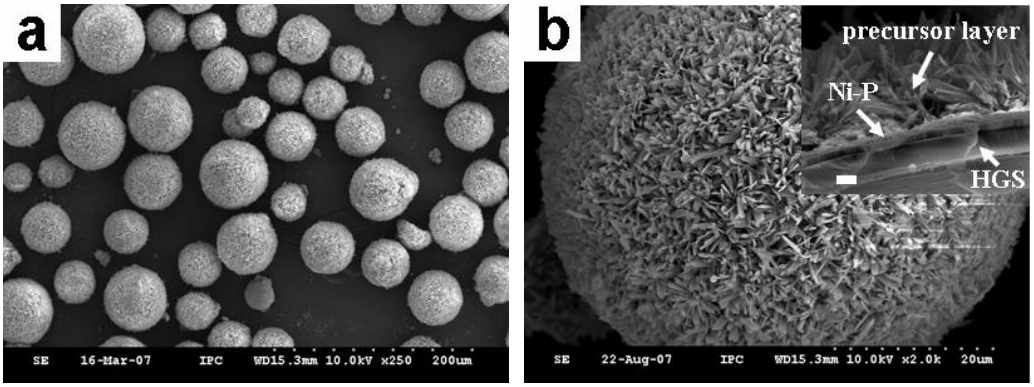


Figure S3. Hysteretic loop at room temperature of the HGS/Ni-Ni_3P core/shell composite hollow spheres obtained after heat treatment at 600℃ for 1.5h (without the $Co_2P_2O_7$ shell).

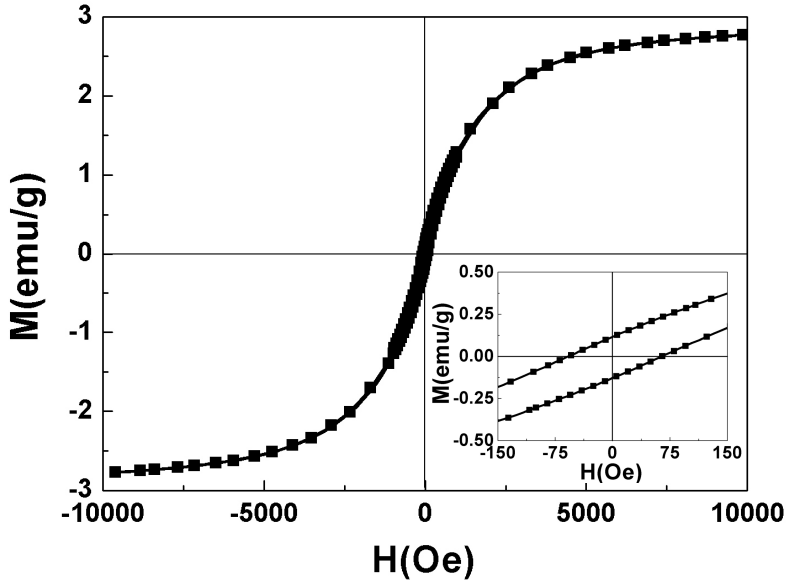


Figure S4. Calculated reflection losses of the glass/Ni-Ni_3P/$Co_2P_2O_7$ core/shell/shell composite hollow spheres obtained after heat treatment at 750℃ for 1.5h (Sample B).