Electronic Supplementary Information

Tailored anisotropic magnetic conductive film assembled from graphene-encapsulated multifunctional magnetic composite microspheres

Jianhua Shen, Yihua Zhu,* Kangfu Zhou, Xiaoling Yang, Chunzhong Li

Key Laboratory for Ultrafine Materials of Ministry of Education, School of Materials Science and Engineering, East China University of Science and Technology, 130 Meilong Road, Shanghai 200237, China

*Corresponding author: Tel.: +86-21-64252022, Fax: +86-21-64250624
E-mail address: yhzhu@ecust.edu.cn (Y. Zhu)
Fig. S1 TEM image of Fe$_3$O$_4$ particles, inset is the enlarged TEM image.

Fig. S2 (a) SEM image of Fe$_3$O$_4$ particles. (b) Diameter distribution of Fe$_3$O$_4$ particles.

Fig. S3 (a) SEM image of Fe$_3$O$_4$@SiO$_2$ microspheres. (b) Diameter distribution of Fe$_3$O$_4$@SiO$_2$ microspheres.
Fig. S4 (a) TEM image of Fe$_3$O$_4$@SiO$_2$@Au-seed microspheres, inset is the enlarged TEM image. (b) Column plot of gold nanoparticles size distribution on Fe$_3$O$_4$@SiO$_2$@Au-seed microspheres.

Fig. S5 (a) SEM image of Fe$_3$O$_4$@SiO$_2$@Au microspheres. (b) Diameter distribution of Fe$_3$O$_4$@SiO$_2$@Au microspheres.

Fig. S6 TGA curve of rGOE-Ms.
**Fig. S7** SEM images of (a) the anisotropic conductive film (ACF) and (b) the isotropic conductive film (ICF), respectively. The insets are high-magnification SEM images.

**Fig. S8** J–V characteristics of (1) the vertical and (3) the horizontal ACF assembled by Fe₃O₄@SiO₂@rGO, (2) the vertical and (4) the horizontal ACF assembled by Fe₃O₄@SiO₂@Au@GO.