Supplementary information for:

**Mesoporous silica coated Gd$_2$(CO$_3$)$_3$:Eu hollow nanospheres for simultaneous cell imaging and drug delivery**

Yanli Wu$^a$, Xianzhu Xu$^b$, Xi Chen$^a$, Ruchun Yang$^a$, Qiang Xiao$^a$$^*$, Yongxiu Li$^c$$^*$

---

$^a$ Jiangxi Key Laboratory of Organic Chemistry, Jiangxi Science & Technology Normal University, Nanchang, 330013, China

$^b$ College of biology, Jiangxi Normal University, Nanchang 330022, China

$^c$ College of Chemistry, Nanchang University, Nanchang 330031, China

Qiang Xiao@tsinghua.org.cn, yxli@nuc.edu.cn;

---

**Biocompatibility of the Gd$_2$(CO$_3$)$_3$:Eu @mSiO$_2$ HNSs**

Since most Gd$^{3+}$-based contrast agents metabolize mainly via the kidney, the kidney cells of the rat were chosen to judge the Gd$_2$(CO$_3$)$_3$:Eu @mSiO$_2$ HNSs’ cytotoxicity. Cells of rat kidney were plated in 96-well plate incubated in a culture medium supplemented with 10% fetal bovine serum (FBS) and 1% penicillin/streptomycin at 37 °C under 5% CO$_2$ for 96 h to allow the cells to attach to the wells. The culture medium was then replaced with a culture medium containing Gd$_2$(CO$_3$)$_3$:Eu @mSiO$_2$ HNSs with different concentrations and the cells were incubated for another 24 h. The cells were then washed with the culture medium without Gd$_2$(CO$_3$)$_3$:Eu @mSiO$_2$ HNSs twice. A 200 μL culture medium containing 10% MTT was introduced on the cells, followed by a 4 h incubation under the same conditions to allow the formation of formazan dye. After the culture medium was removed, the purple formazan product was allowed to dissolve in DMSO for 10 min. The amount of formazan formed by the
cells was measured with an enzyme-linked immunosorbent assay reader at 490 nm. The following formula was used to evaluate the inhibition of cell growth by Gd$_2$(CO$_3$)$_3$:Eu @mSiO$_2$ HNSs.

Cell viability (%) = (mean Abs of treatment group/mean Abs of control)×100 %

Fig S1. Hydrodynamic diameters of Gd$_2$(CO$_3$)$_3$:Eu@mSiO$_2$ HNSs in deionized water as measured by DLS.

Fig S2. XRD pattern of Gd$_2$(CO$_3$)$_3$:Eu HNSs

Fig S3. UV-vis absorption spectrum of DOX in PBS
Biocompatibility of the Gd$_2$(CO$_3$)$_3$:Eu @mSiO$_2$ HNSs

To demonstrate the potential fields of application in vivo, the biocompatibility of the HNSs was measured using the MTT assay on the rat kidney cells. The viabilities of rat kidney cells treated with Gd$_2$(CO$_3$)$_3$:Eu@mSiO$_2$ at various concentrations are depicted in Fig S4, with the viability of the untreated cells set to 100 %. As can be seen, the as-prepared sample showed almost no toxicity to rat kidney cells.

![Bar chart showing cell viabilities of rat kidney cells treated with Gd$_2$(CO$_3$)$_3$:Eu@mSiO$_2$ at various concentrations.](image)

**Fig S4.** Cell viabilities of rat kidney cells treated with Gd$_2$(CO$_3$)$_3$:Eu@mSiO$_2$ at various concentrations.