

Supplementary Information for

Analysis of competitive binding of several metal cations by graphene oxide reveals the quantity and spatial distribution of carboxyl groups on its surface

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1. Quantitative determination of Gd(III) content in supernatants.

The quantitative determination of Gd³⁺ in supernatants was conducted spectrophotometrically with the indicator Xylenol Orange. Administration of Gd³⁺ into the indicator solution in the presence of the acetate buffer (pH=5.2) results in changing of the indicator absorption spectrum (Fig. S1).

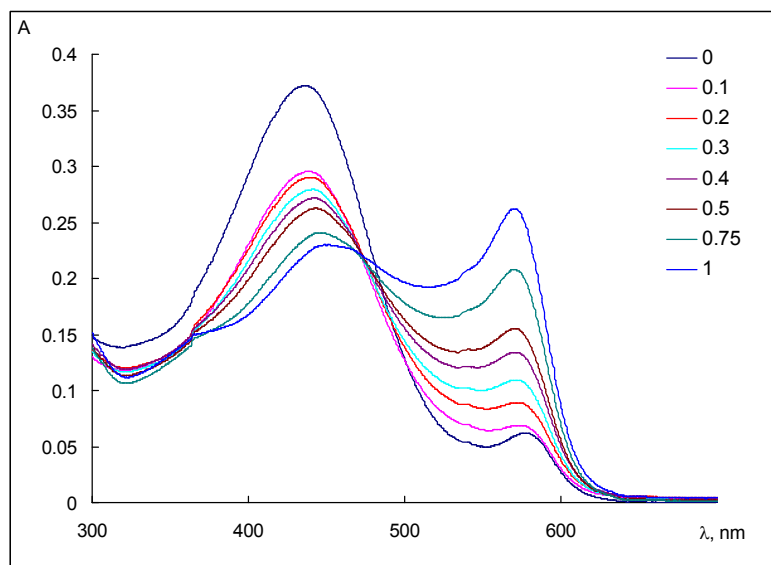


Figure S1. Absorption spectra of Xylenol Orange (0 mM Gd(III)) and its gadolinium complexes at varying Gd(III) concentrations (0.1-1 mM).

The intensity of the 570 nm absorption band increases, the intensity of the 430 nm absorption band decreases. The calibration curve for the Gd^{3+} concentration range from 0 through 1.0 mM was constructed with respect to the 570 nm absorption band (Fig. S2). The as-constructed calibration curve was used to determine the concentration of the free Gd^{3+} ions in the supernatants separated from the Gd^{3+} -GO solutions (Table 1 of the main text).

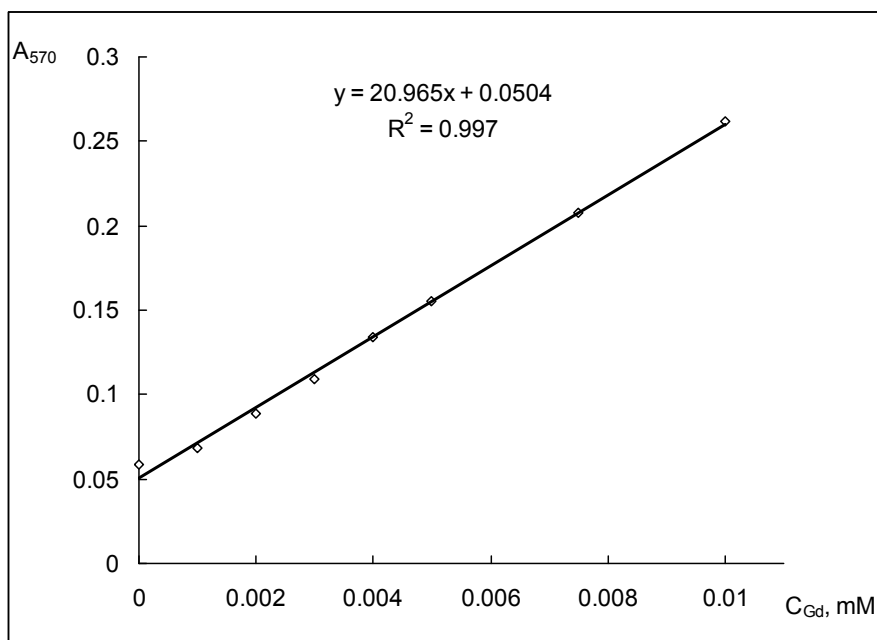


Figure S2. Calibration curve for absorption of the Xylenol Orange solutions; measured at 570 nm (based on absorption spectra from Fig. S1).

2. Additional Figures

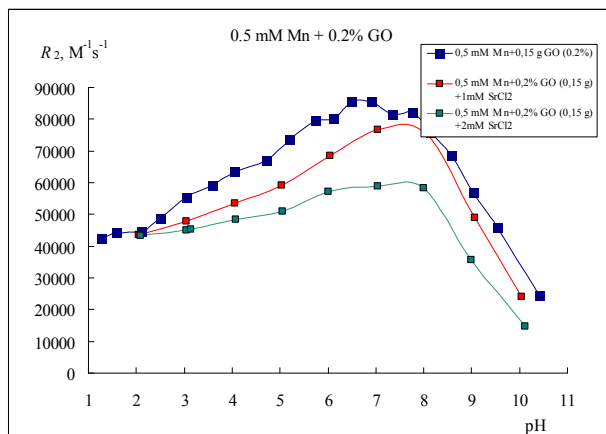


Figure S3. The function of the spin-spin relaxivity (R_2) of the aqueous Mn(II)-GO solutions on pH. Curve (1) is for the Mn(II)-GO system; curve (2) the Mn(II)-GO system in presence of 1.0 mM Sr(II); curve (3) the Mn(II)-GO system in presence of 2.0 mM Sr(II). $C_{\text{Mn(II)}} = 0.5 \text{ mM}$; $C_{\text{GO}} = 2 \text{ wt.}\%$.

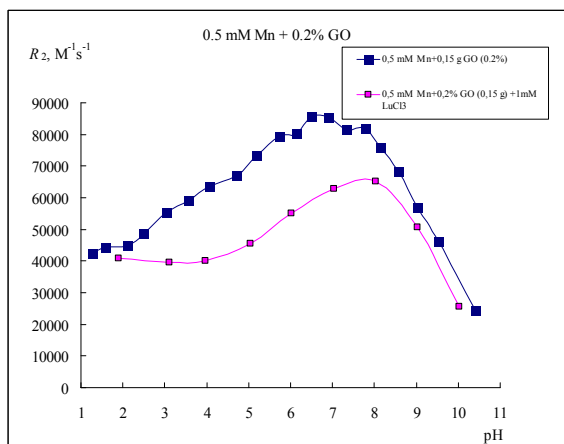


Figure S4. The function of the spin-spin relaxivity (R_2) for the aqueous Mn(II)-GO solutions on pH. Curve (1) is for the Mn(II)-GO system; curve (2) the Mn(II)-GO system in presence of 1.0 mM Lu(III). $C_{\text{Mn(II)}} = 0.5 \text{ mM}$; $C_{\text{GO}} = 2 \text{ wt.}\%$.

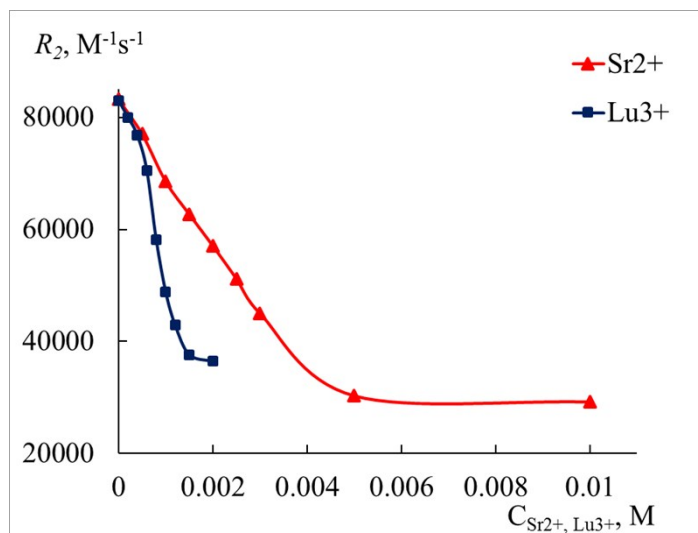


Figure S5. Function of the spin-spin relaxivity R_2 for the Mn(II)-GO solutions on concentration of Sr(II) (red line), and Lu(III) (blue line). pH=6. $C(\text{Mn}^{2+}) = 0.5 \text{ mM}$; $C_{\text{GO}} = 0.2 \text{ wt.}\%$.

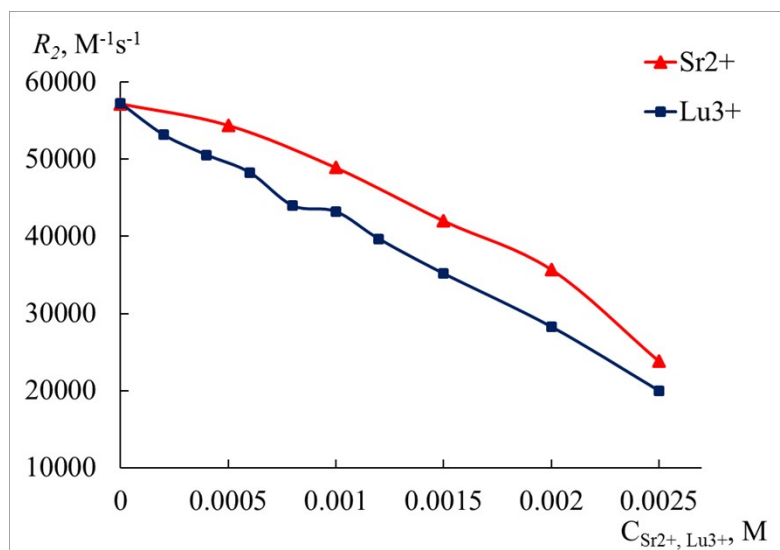


Figure S6. Function of the spin-spin relaxivity R_2 for the Mn(II)-GO solutions on concentration of Sr(II) (red line), and Lu(III) (blue line). pH=9. $C(\text{Mn}^{2+}) = 0.5 \text{ mM}$; $C_{\text{GO}} = 0.2 \text{ wt.}\%$.