Supporting Information

Novel core-shell structure microspheres based on lanthanide complexes for white light emission and fluorescence sensing

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Fig. S1 The synthesis process of SiO$_2$@Ln-dpa.

Scheme S1. The structure and typical coordination environment of [H$_2$NMe$_2$]$_3$[Ln(dpa)$_3$].
Fig. S2 The selected SEM images of silica microspheres.

Fig. S3 The selected SEM images of SiO$_2$@Ln-dpa.
Fig. S4 The selected TEM images of SiO$_2$@Ln-dpa.

Fig. S5 Particle size distribution of as-synthesized bare silica microspheres.
Fig. S6 Particle size distribution of as-synthesized SiO$_2$@Ln-dpa.

Fig. S7 Energy dispersive analysis by X-rays (EDX) spectroscopy of SiO$_2$@Eu-dpa.
Fig. S8 Raman spectra of SiO$_2$@Ln-dpa.

Fig. S9 Excitation spectrum and emission spectrum of SiO$_2$@Sm-dpa.
Fig. S10 Excitation spectrum and emission spectrum of SiO$_2$@Dy-dpa.

Fig. S11 CIE chromaticity diagram of (a) SiO$_2$@Eu-dpa; (b) SiO$_2$@Tb-dpa; (c) SiO$_2$@Sm-dpa; (d) SiO$_2$@Dy-dpa.
Fig. S12 (a) UV–vis absorption spectroscopy of acetone; (b) ultraviolet diffuse-reflectance spectra of H₂dpa and SiO₂@Eu-dpa.

Fig. S13 Photograph of the luminescence change after addition of Cu²⁺ in SiO₂@Eu-dpa suspension under UV light.
Table S1. The luminescent data of as-synthesized materials.

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<th>Lifetime</th>
<th>Total quantum yield</th>
<th>Excitation wavelength</th>
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<tr>
<td>Eu-dpa</td>
<td>1882 μs</td>
<td>34.1%</td>
<td>293 nm</td>
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<tr>
<td>Tb-dpa</td>
<td>1663 μs</td>
<td>23.5%</td>
<td>295 nm</td>
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<td>SiO₂@Eu-dpa</td>
<td>2398 μs</td>
<td>45.7%</td>
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<td>SiO₂@Tb-dpa</td>
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<td>30.4%</td>
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<tr>
<td>SiO₂@(Eu:Tb)-dpa</td>
<td>2358 μs</td>
<td>38.2%</td>
<td>290 nm</td>
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<td>SiO₂@(Dy:Eu)-dpa</td>
<td>2066 μs</td>
<td>28.1%</td>
<td>300 nm</td>
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