

# Supplementary Materials: Incorporation of Mg<sup>2+</sup>/Si<sup>4+</sup> in ZnGa<sub>2</sub>O<sub>4</sub>:Cr<sup>3+</sup> to Generate Remarkably Improved Near-Infrared Persistent Luminescence

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**Table S1.** The binding energies of the Zn 2p<sub>3/2</sub> core-levels of ZGMSO:Cr<sup>3+</sup>.

| <i>x</i> | Binding Energy | Area Percent |
|----------|----------------|--------------|
| 0        | 1022.53        | 23.60        |
|          | 1021.97        | 76.40        |
| 0.01     | 1022.34        | 26.27        |
|          | 1021.93        | 73.73        |
| 0.15     | 1022.20        | 30.14        |
|          | 1021.76        | 69.86        |

**Table S2.** The binding energies of the Ga 2p<sub>3/2</sub> core-levels of ZGMSO:Cr<sup>3+</sup>.

| <i>x</i> | Binding Energy/eV | Area Percent |
|----------|-------------------|--------------|
| 0        | 1118.03           | 84.38        |
|          | 1117.47           | 15.62        |
| 0.01     | 1118.15           | 83.16        |
|          | 1117.84           | 16.84        |
| 0.15     | 1117.96           | 81.85        |
|          | 1117.38           | 18.15        |

**Table S3.** The binding energies of the Mg 1s core-levels of ZGMSO:Cr<sup>3+</sup>.

| <i>x</i> | Binding Energy/eV | Area Percent |
|----------|-------------------|--------------|
| 0.01     | 1303.99           | 51.58        |
|          | 1299.76           | 48.42        |
| 0.15     | 1304.13           | 34.34        |
|          | 1300.71           | 65.66        |

**Table S4.** The binding energies of the Si 2p core-levels of ZGMSO:Cr<sup>3+</sup>.

| <i>x</i> | Binding Energy/eV | Area Percent |
|----------|-------------------|--------------|
| 0.01     | 108.95            | 27.69        |
|          | 105.20            | 72.31        |
| 0.15     | 109.01            | 24.23        |
|          | 105.20            | 75.77        |