

Electronic Supplementary Information

The effects of Gd³⁺ substitution on the crystal structure, site symmetry, and photoluminescence of Y/Eu layered rare-earth hydroxide (LRH) nanoplates

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Chemical analysis of the LRH products:

The Y, Gd, and Eu contents of the hydrothermal products were analyzed by the inductively coupled plasma (ICP) technique (Aurora, Jarrell-Ash Co. Ltd., MA, USA) with an accuracy of 0.01wt%, and the NO₃⁻ contents were assayed by the spectrophotometric method on a Ubest-35 spectrophotometer (Japan Spectroscopic Co. Ltd, Tokyo, Japan) with an experimental error of ±0.1 wt%. The average of three measurements was used to denote the content of the analyzed species, and the results are shown in Table 1.

Table 1. Results of Elemental analysis of the (Y_{1-x}Gd_xEu_{0.05})₂(OH)₅NO₃·nH₂O LRH samples

| The <i>x</i> | Y (wt%) | Gd (wt%) | Eu (wt%) | NO ₃ ⁻ (wt%) | Experimentally derived chemical formula |
|--------------|---------|----------|----------|------------------------------------|--|
| 0.25 | 30.13 | 19.63 | 3.59 | 14.0 | (Y _{0.72} Gd _{0.26} Eu _{0.05}) ₂ (OH) _{5.22} (NO ₃) _{0.96} ·nH ₂ O |
| 0.50 | 18.89 | 37.22 | 3.76 | 13.6 | (Y _{0.43} Gd _{0.48} Eu _{0.05}) ₂ (OH) _{4.88} (NO ₃) _{0.88} ·nH ₂ O |
| 0.75 | 7.80 | 49.52 | 3.22 | 16.7 | (Y _{0.21} Gd _{0.74} Eu _{0.05}) ₂ (OH) _{4.74} (NO ₃) _{1.26} ·nH ₂ O |
| 0.95 | -- | 60.67 | 3.03 | 14.0 | (Gd _{0.97} Eu _{0.05}) ₂ (OH) _{4.98} (NO ₃) _{1.14} ·nH ₂ O |

The amount of hydroxyls was derived based on molecular neutrality.