

Supplementary Information

One-pot solvothermal synthesis of uniform layer-by-layer self-assembled ultrathin hexagonal Gd₂O₂S nanoplates and luminescent properties from single doped Eu³⁺ and codoped Er³⁺, Yb³⁺

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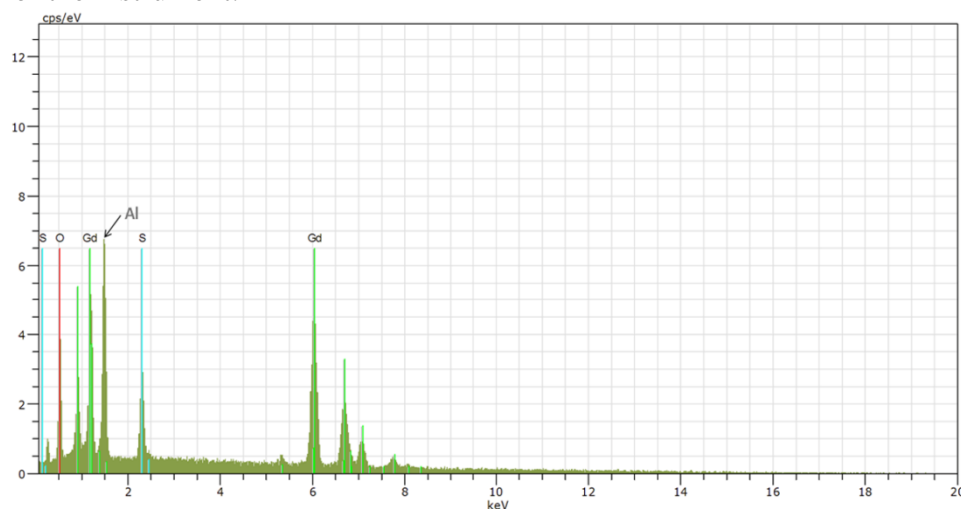
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Table S1. EDX dates of the Gd₂O₂S sample obtained after 24 h solvothermal treatment.

El	unn.(wt.%)	C norm.(wt.%)	C Atom.(at.%)
O	12.31	13.22	53.57
Gd	74.62	80.15	33.04
S	6.17	6. 63	13.40

Figure S1. EDX Spectrum of the sample prepared by the Gd₂O₂S sample obtained after 24 h solvothermal treatment. The peak labeled as “Al” results from the sample stage of the instrument.



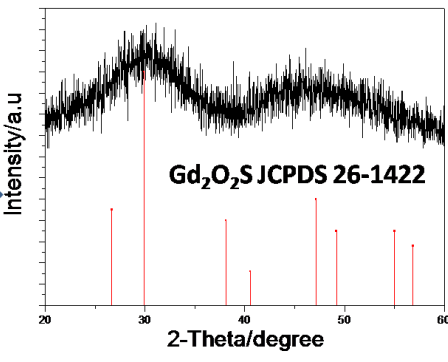
	ethanol	
ethanediamine	√	
ethanolamine	amorphous	
Diethanol Amine	X	
triethanolamine	X	
1,6-Diaminlhexane	X	
oleyamine	X	

Table S2. shows the influence of amine solvent as a main solvent on the phase formation, when 5 ml ethanol is used as auxiliary solvent and the total volume of mixed solvents is 40 ml. “√” means Gd_2O_2S phase is formed and “X” means not. Only ethanediamine supports the phase formation. In ethanolamine, the amorphous Gd_2O_2S was formed. Bur other amine solvent dosen’t work. From this series of experiments, it is found that ethanediamie really play a key role in the phase formation of Gd_2O_2S .

	5ml	10ml	15ml	20ml
ethanol	√	√	√	X
ethylene glycol	X	X	X	X
diethylene glycol	√	√	√	X
1, 4-BD	√	√	√	X
water	X	X	X	X

Table S3. shows the influence of auxiliary solvent in the mixed solvents on the phase formation of $\text{Gd}_2\text{O}_2\text{S}$ when the main solvent is ethanediamine and the total volume of the mixed solvents is 40 ml. “√” means $\text{Gd}_2\text{O}_2\text{S}$ phase is formed and “X” means not. It is found that most alcoholic solvents have little influence on the phase formation except for ethylene glycol. And normally, the amount of alcoholic solvent should be lower than 20 ml, because less amount of ethanediamine will not be able to dissolve sufficient sulfur powders. Additionally, water should be strictly restricted, because it will introduce the competing formation of $\text{Gd}(\text{OH})_3$.

Figure S2. The image of the sample prepared by solvothermal method for 24 h without oleylamine.

