

**Supporting Information for “Novel cocoon-Like Au/La₂O₃ nanomaterials:
synthesis and their ultra-enhanced cataluminescence performance to volatile
organic compounds”**

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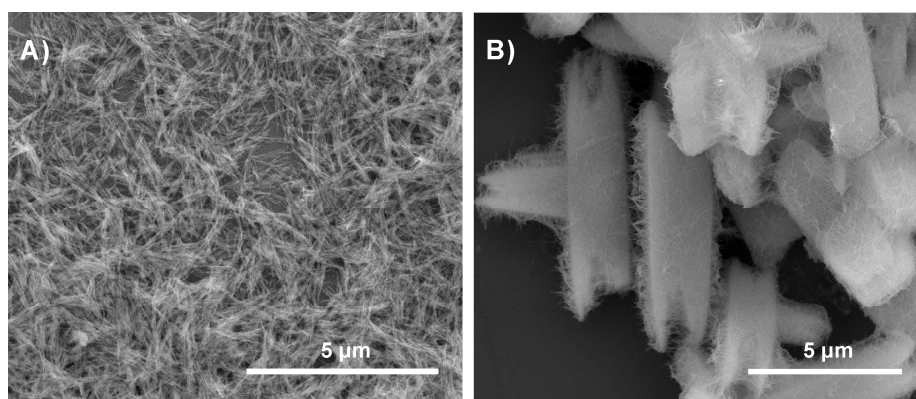


Fig. S1. (A) SEM image of $\text{La}(\text{OH})_3$ precursors (1.5 mmol of oxalic acid was firstly added, after stirring for about 20 min, 50 mmol of NaOH was added). (B) SEM image of $\text{La}(\text{OH})_3$ precursors (50 mmol of NaOH was firstly added, after stirring for about 20 min, 1.5 mmol of oxalic acid was added). Lanthanum nitrate: 1 mmol; Reaction temperature: 180 °C; Reaction time: 24 h.

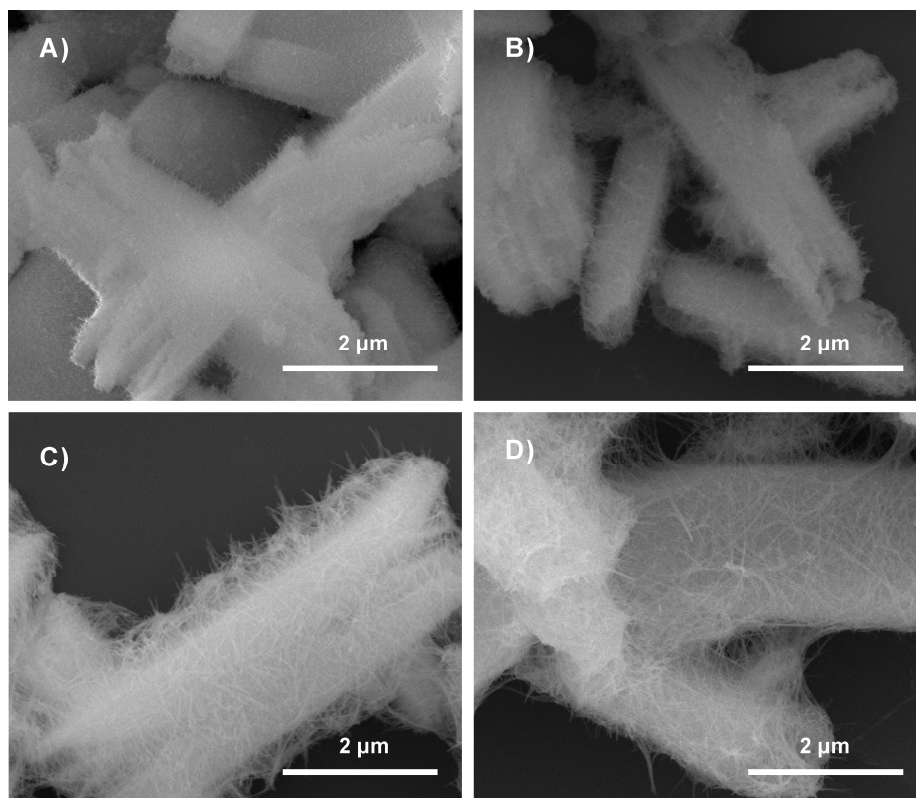


Fig. S2. SEM images of $\text{La}(\text{OH})_3$ precursors synthesized at different reaction temperature: (A) 140 °C, (B) 160 °C, (C) 180 °C, (D) 200 °C. Lanthanum nitrate: 1 mmol; Oxalic acid: 1.5 mmol; NaOH: 50 mmol; Reaction time: 24 h.

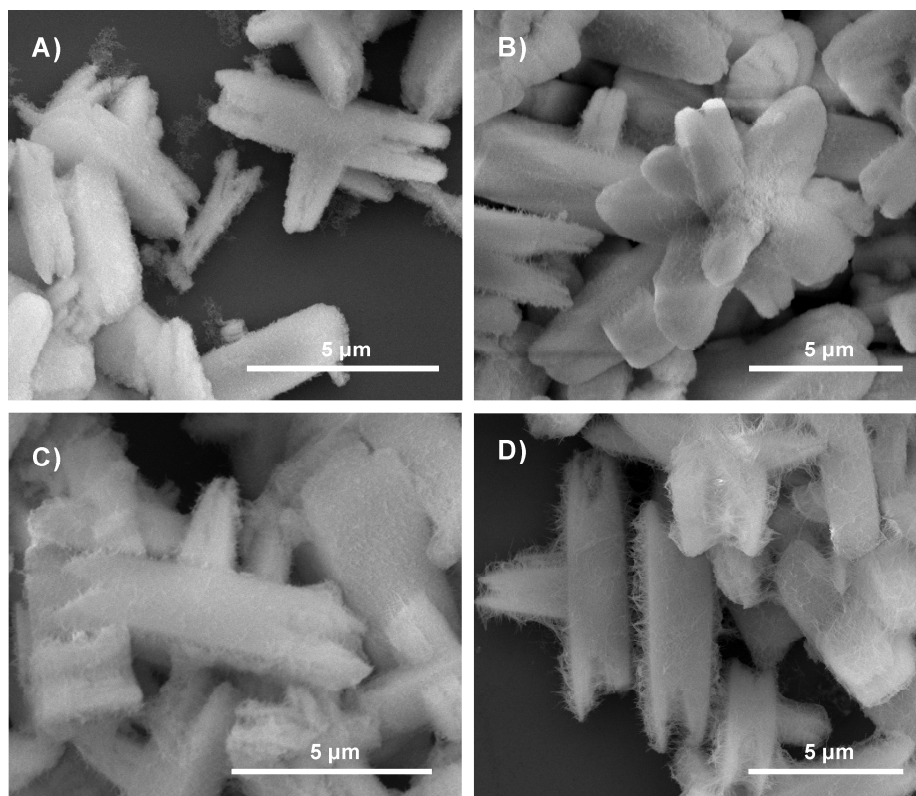


Fig. S3. SEM images of $\text{La}(\text{OH})_3$ precursors synthesized at different reaction time: (A) 4 h, (B) 9 h, (C) 12 h, (D) 24 h. Lanthanum nitrate: 1 mmol; Oxalic acid: 1.5 mmol; NaOH: 50 mmol; Reaction temperature: 180 °C.

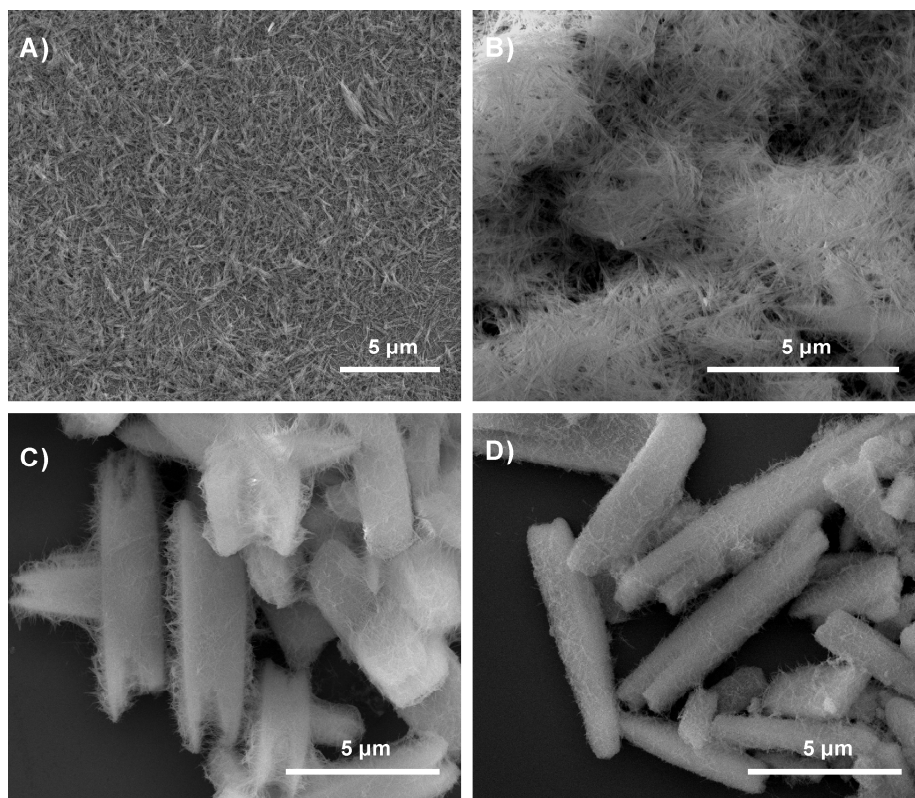


Fig. S4. SEM images of La(OH)₃ precursors synthesized at different concentration of oxalic acid: (A) 0 mmol, (B) 0.5 mmol, (C) 1.5 mmol, (D) 3.0 mmol. Lanthanum nitrate: 1 mmol; NaOH: 50 mmol; Reaction temperature: 180 °C; Reaction time: 24 h.

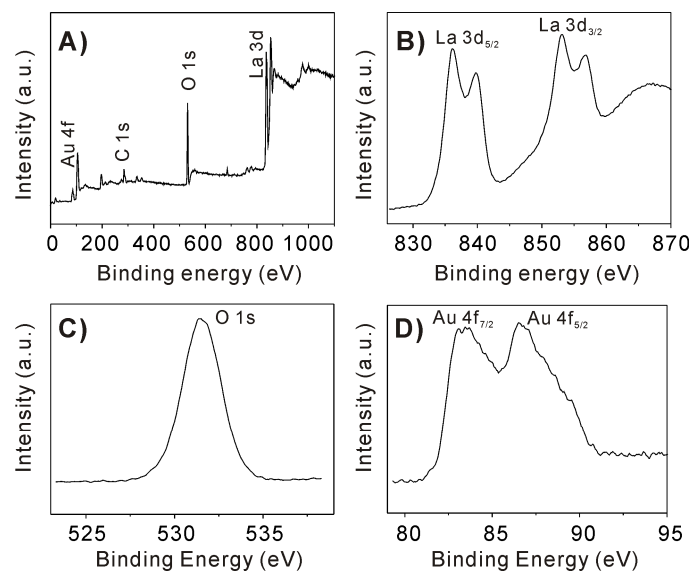


Fig. S5. XPS spectra of the cocoon-like Au/La₂O₃. (A) Survey spectrum. (B) La 3d spectrum. (C) O 1s spectrum. (D) Au 4f spectrum.