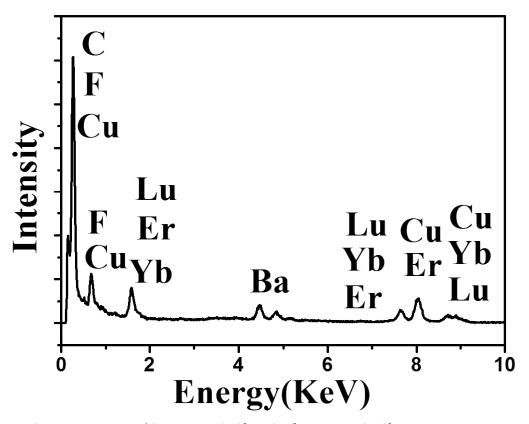
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Synthesis of ultra-small BaLuF<sub>5</sub>: Yb<sup>3+</sup>, Er<sup>3+</sup>@ BaLuF<sub>5</sub>: Yb<sup>3+</sup> active-core-active-shell nanoparticles with enhanced up-conversion and down-conversion luminescence by a layer-by-layer strategy

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## **Supporting information**



 $\textbf{Fig. S1} \qquad \text{The energy-dispersive X-ray spectrum of the BaLuF}_5: 20 \text{mol } \% \text{Yb}^{3+}, 2 \text{mol } \% \text{Er}^{3+} \textcircled{@} \text{ BaLuF}_5: 5 \text{mol } \% \text{ Yb}^{3+} \text{ NPs.}$