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Supporting Information

**Highly sensitive and accurate detection of cholesterol based on single red
upconversion biosensor**

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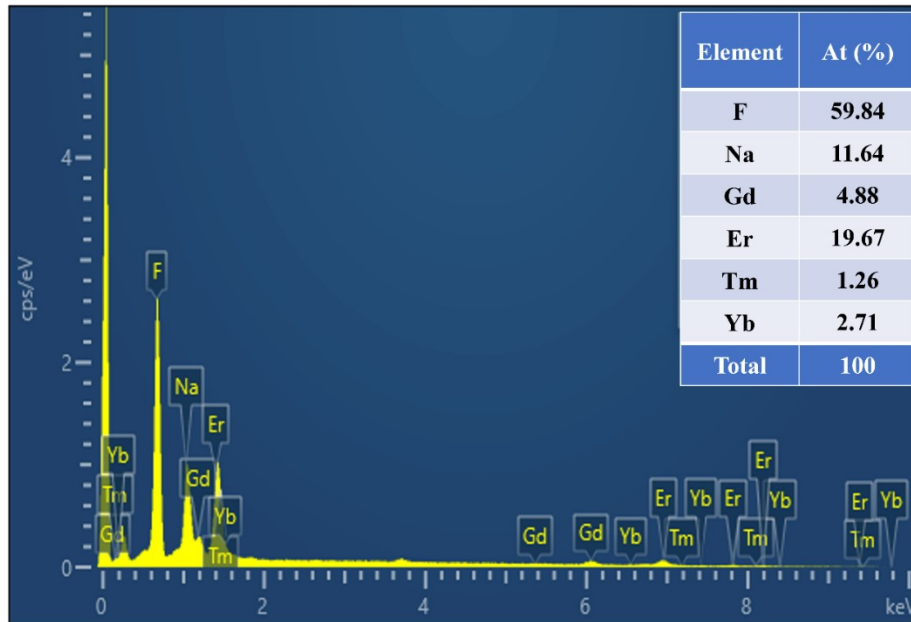
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27 **Fig. S1** Element distribution of NaErF₄:0.5%Tm@NaGdF₄:40%Yb UCNP

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41 The infrared spectrums of the prepared nanomaterials (**Fig. S2**) show the -OH

42 stretching vibration peak of the OA molecule corresponding to 3432 cm^{-1} , the -CH₂

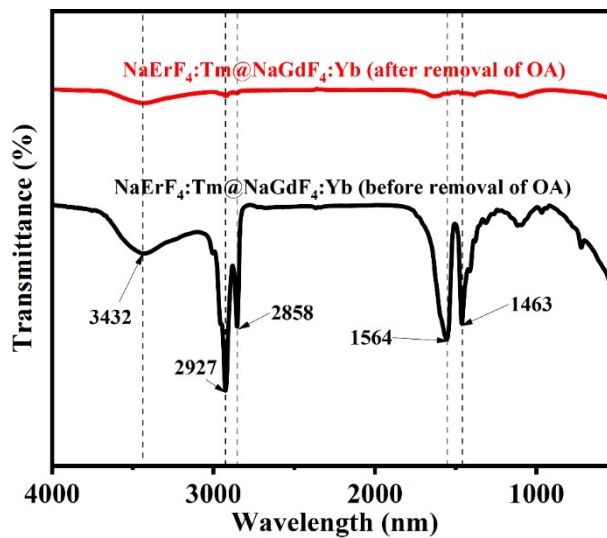
43 stretching vibration peak of the OA molecule corresponding to 2927 and 2858 cm^{-1} ,

44 and the -COO stretching vibration peak corresponding to 1564 and 1463 cm^{-1} become

45 weak or even disappear. These indicate that most of the OA molecules attached to the

46 surface of UCNPs have been removed.

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Fig. S2 The infrared spectrums of the prepared UCNPs

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