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Tunable phase and upconverting luminescence of Gd^{3+} co-doped $\text{NaErF}_4:\text{Yb}^{3+}$ nanostructures

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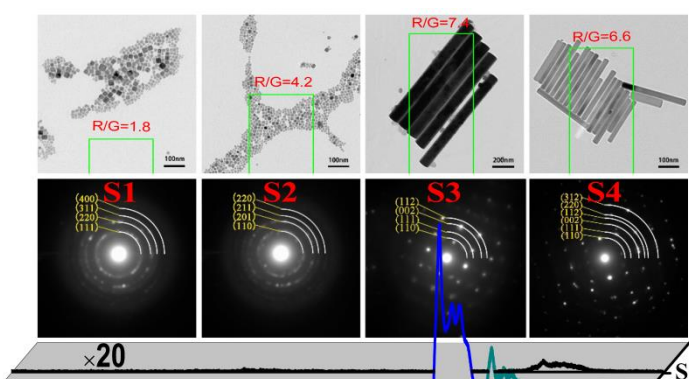
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Graphical abstract

The phase, morphology and emission efficiency of upconverting $\text{NaErF}_4:\text{Yb}^{3+}$ nanostructures are simultaneously tuned by controlling the reaction temperatures and Gd^{3+} doping contents. The higher synthesis temperature leads to the morphology evolution from nanoparticles to nanorods. The integrated red to green intensity ratio is much improved for Gd^{3+} codoping samples. The radiative/non-radiative transition probabilities of Er^{3+} different emission states could be affected by Gd^{3+} doping in different ways as for nanoparticles and nanorods, respectively. $\text{NaErF}_4:\text{Yb}^{3+},\text{Gd}^{3+}$ nanostructures are expected to have promising applications in multimodal bioimaging for deeper tissue penetration.



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