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Self-suspended rare-earth doped up-conversion luminescent waveguide: propagating and directional radiation

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Fig. S1–Fig. S3

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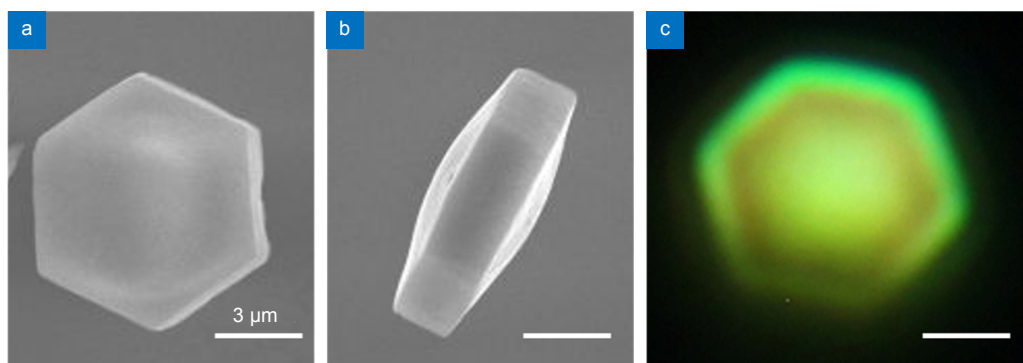


Fig. S1 | TEM (a–b) and optical (c) images of ordinary disk-shaped $\text{NaYF}_4:\text{Yb}^{3+}/\text{Er}^{3+}$ microcrystal. For the unsuspended disk-like waveguide, it was impossible to realize directional radiation.

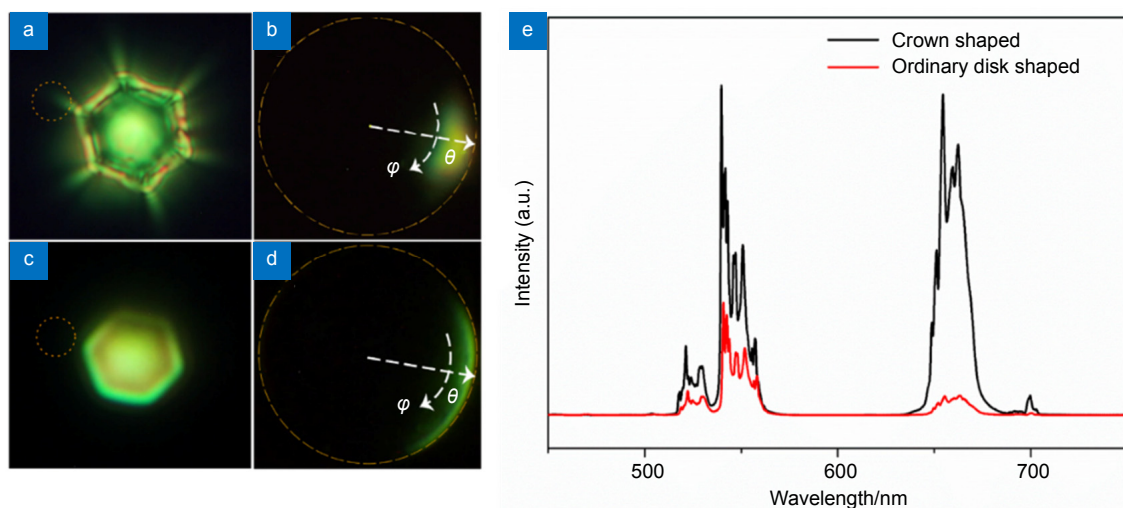


Fig. S2 | UC fluorescence patterns and Fourier images of the selected region of single crown-shaped (a–b) and ordinary-shaped (c–d) $\text{NaYF}_4:\text{Yb}^{3+}/\text{Er}^{3+}$. Luminescence spectra (e) of single crown-shaped and ordinary-shaped $\text{NaYF}_4:\text{Yb}^{3+}/\text{Er}^{3+}$.

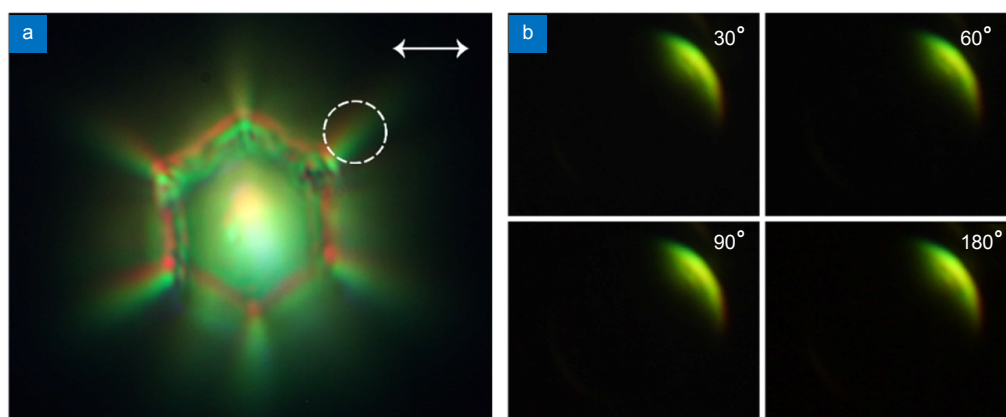


Fig. S3 | Polarization dependent radiation modes of the self-suspended luminescent waveguide. The directional emission (a) and the optical patterns (b) on the image plane with different polarization directions. For different polarizations, the Fourier images remained nearly unchanged.