Electronic Supplementary Material (ESI) for Journal of Materials Chemistry C.

Supporting Information

Fast transformation of a Rare-earth doped luminescent sub-microcrystal via plasmonic nanoislands

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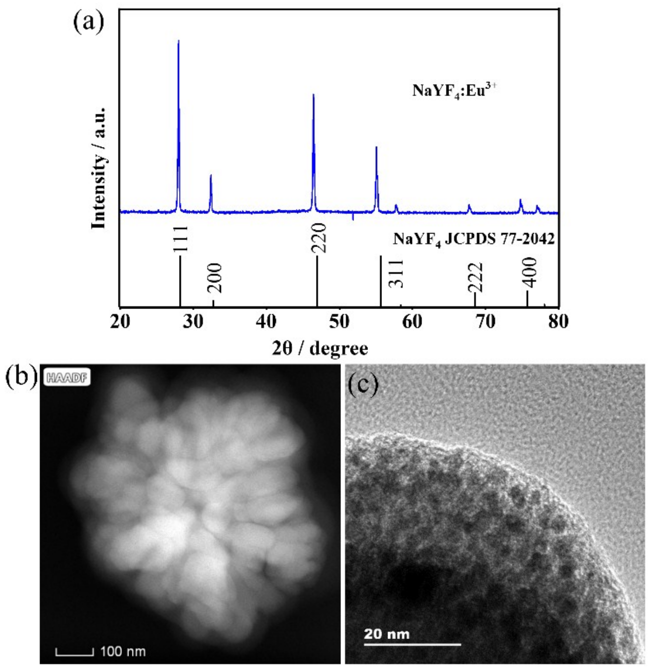
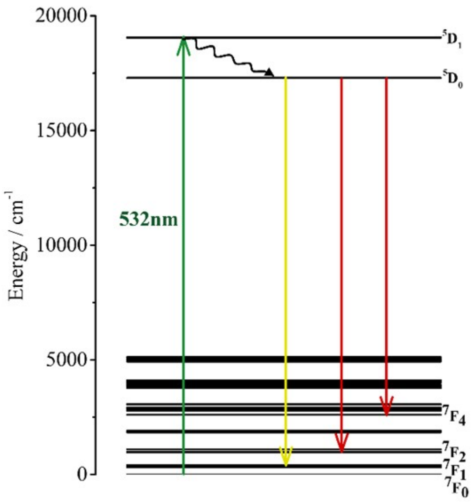
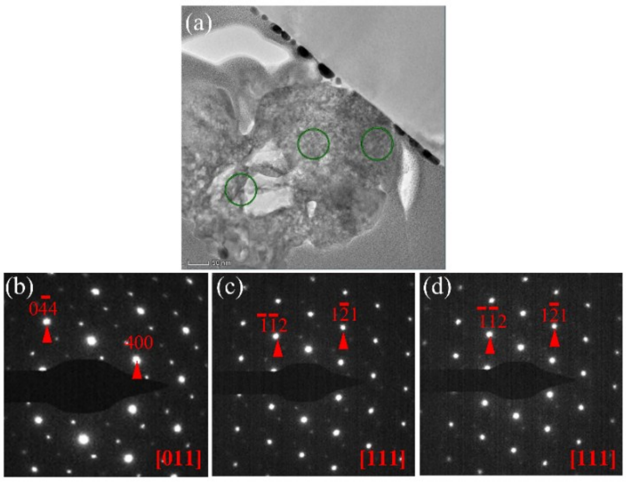


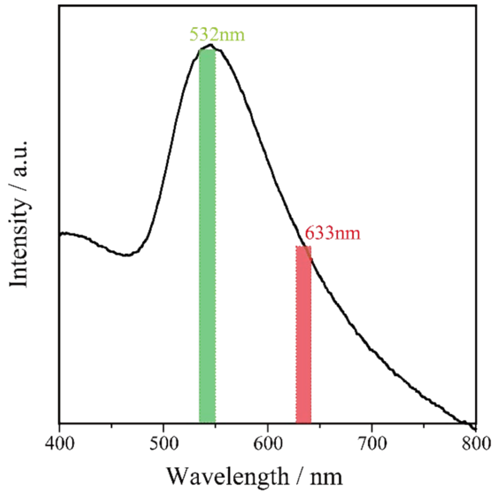
Supplementary Fig. S1 (a) XRD patterns of as-synthesized $NaYF_4$:Eu^{3+} nanoflower and the standard pattern of cubic phase $NaYF_4$ (JCPDS No.77-2042); (b-c) HAADF-STEM and high-resolution TEM images of $NaYF_4$:Eu^{3+} nanoflowers, respectively.



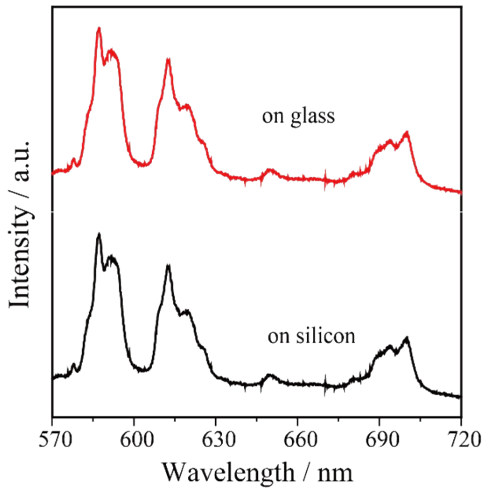
Supplementary Fig. S2 Schematic energy levels of Eu^{3+} and corresponding transitions related to the photoluminescence emissions. The wide bands with weak luminescence intensities centered at 590 nm, 615 nm and 700 nm are related to the transition from $^5D_0$ to $^7F_1$, $^7F_2$ and $^7F_4$, respectively.



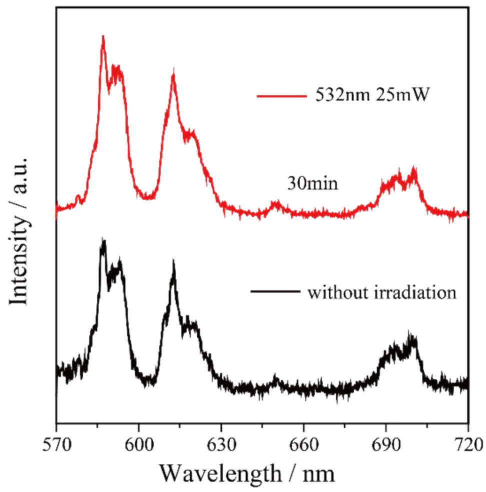
Supplementary Fig. S3 (a) TEM image of a cut thin foil from the optimized nanoparticle; (b-d) SAED patterns of partial particle corresponding to the left, middle, right circles marked in green color in (a) taken along the [011] , [111] and [111] zone axis, respectively. All the diffraction spots can be indexed by the single crystal Y_2O_3 cubic structure with *Ia-3* space group and a lattice parameter a=10.604 Å.



Supplementary Fig. S4 Normalized extinction spectra of AuNIs annealed at 300 °C. The LSPR peak is near the laser irradiation wavelength of 532nm.



Supplementary Fig. S5 Luminescence spectra of sub-microcrystal on glass and silicon substrates with 532 nm laser irradiation for 30 min (25 mW). There are no changes in the luminescence spectra for either substrate following 25 mW of 532 nm laser irradiation for 30 min, which indicates the plasmonic AuNIs plays an important role in crystal transformation.



Supplementary Fig. S6 In-situ luminescence spectra of $NaYF_4:Eu^{3+}$ on smooth Au film with and without 532nm laser irradiation (25 mW for 30min). No obvious changes are observed in the luminescence spectra.