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Sensitization of sub 10 nm Yb^{3+}-doped $NaYF_4$ nanoparticles with visible light through 1,2,3,4,5,6,7-heptafluro-8-hydroxyanthracene-9,10-dione chromophore HAIZHOU LU, School of Physics and Astronomy, Queen Mary University of London, Mile End Road, London, E1 4NS, UK, YU PENG, School of Biological and Chemical Sciences, Queen Mary University of London, Mile End Road, London, E1 4NS, UK, IGNACIO HERNÁNDEZ, Dpto. CITIMAC, Universidad de Cantabria, Facultad de Ciencias, Avda. Los Castros, s/n 39005, Santander, Spain, WILLIAM GILLIN, School of Physics and Astronomy, Queen Mary University of London, Mile End Road, London, E1 4NS, UK — Uniform sub 10 nm Yb^{3+}-doped $NaYF_4$ nanoparticles were prepared using a conventional hydrothermal method. Yb^{3+} ions doped inside the $NaYF_4$ nanoparticles can be sensitized with 1,2,3,4,5,6,7-heptafluro-8-hydroxyanthracene-9,10-dione (HL), which is bounded onto the surface of the nanoparticle, through the so called "antenna effect." Strong sensitization is achieved with the broad visible light excitations. The overall near infrared (NIR) emission from Yb^{3+} ions is increased by a factor of 5 as a result of the broad and strong absorption of HL chromophore compared with the ytterbium's intrinsic absorption during the 980 nm regime. Interestingly, an energy migration process from Yb^{3+} ions on the surface to inner-side Yb^{3+} ions of doped nanoparticle is demonstrated by the time-resolved spectroscopy method. It gives a direct evidence that the local environment between the surface and center of the nanoparticle is different. We believe our material will contribute to the NIR emitters with a strong visible absorption for the bio-materials.

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