

Developing optical up-conversion process via embedded silver nanostructures

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Abstract: Up-conversion optical process has been extensively used over the last two decades in different applications such as bioimaging, sensors, and optical energy harvesting, depending on converting lower energy photons into higher energy ones. There are different hosts acting as optical centers for up-conversion process, however erbium-doped-NaYF₄ is one of the most promising used materials due to its relatively low-phonon environment. In this paper, the development of up-conversion efficiency is analytically studied through addition of silver nanostructures such as nanoparticles and nanorods. This work introduces the analysis of both luminescence and up-conversion efficiency changes of erbium-doped-NaYF₄ (Er-NaYF₄) according to the enhanced carriers population according to the added silver nanostructures. The results show that silver nanorods in a higher efficiency improvement compared to the addition of nanoparticles.