Abstract

The efficiency of silicon solar cells can be improved through effective spectral conversion using a layer of luminescent materials. The present work deals with the development of down-converting, dual-mode (down-shifting/up-converting) and multi mode (down-converting/down-shifting/up-converting) luminescent materials by hydrothermal method to act as a spectral converter in solar cell applications. The $CaMoO_4$ is taken as host material and single rare earth ions like Er^{3+}, Eu^{3+}, Sm^{3+}, Tb^{3+}, Tm^{3+} are chosen as dopant. A couple of rare earth ions like Er^{3+}-Yb^{3+} , Eu^{3+}-Yb^{3+} , Tb^{3+}-Yb^{3+} , Er^{3+}-Eu^{3+}-Yb^{3+} are chosen as codopant. Furthermore, an attempt has been made to synthesize the Eu^{3+}-Al^{3+} codoped $CaMoO_4$ phosphors for white LEDs but these phosphors were not effectively pumped by standard UV-LED chip. Another white light emitting device based on the combination of colloidal red CdSe/ZnS quantum dots (QDs) and $BaMgAl_{10}O_{17}$:Mn^{2+} (BAM) green phosphor was fabricated. This device could meet the requirement of luminescence efficiency and colour gamut value close to the recommended values.

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