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Mn2+-Yb3+ Super-Exchange interaction in zinc phosphate glass

Zinc phosphate glasses with varying compositions of Mn2+ and Yb3+ were successfully synthesized using the conventional melt and quenching method. Mn2+ exhibits simultaneous green-orange emission through four-and six-fold coordination upon excitation at 350 nm, and via up-conversion when excited at 980 nm. Yb3+ shows its characteristic 976 nm emission due to the $2F5/2 \rightarrow 2F7/2$ transition when excited at 350 nm within the $6A1(S) \rightarrow 4E(D)$ Mn2+ energy level. This phenomenon is proposed to occur due to the presence of Mn2+-Yb3+ dimers or through charge transfer via oxygen bridges. An energy diagram is provided to illustrate the mechanism of this bidirectional energy transfer. Absorbance, excitation, and emission spectroscopic studies are presented.

Keywords

Luminescence, Up-Conversion, Mn2+, Yb3+, Super-Exchange, Energy Transfer, Zinc Phosphate Glass

Reference

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Author approval

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Author will attend

I confirm

Primary author: FÉLIX QUINTERO, Héctor Aníbal

Co-authors: Dr YEE RENDON, Cristo Manuel (Universidad Autonoma De Sinaloa); ATONDO RUBIO, Gelacio (Universidad Autonoma de Sinaloa); Dr MILLÁN ALMARAZ, Jesús Roberto (Universidad Autónoma de Sinaloa); Dr AVILA GAXIOLA, Jorge Carlos (Universidad Autónoma de Sinaloa)

Presenter: FÉLIX QUINTERO, Héctor Aníbal

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