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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⟶2F7/2 transition when excited at 350 nm within the 6A1(S)⟶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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