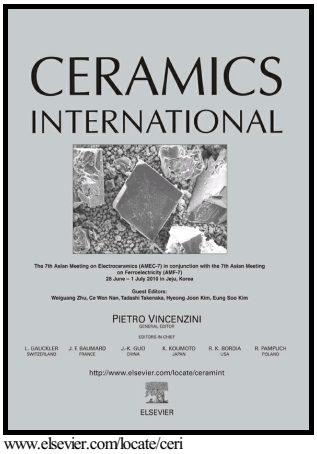

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Largely enhanced mechanoluminescence properties in Pr^{3+}/Gd^{3+} co-doped $LiNbO_3$ phosphors

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Abstract

Pr^{3+}/Gd^{3+} co-doped $LiNbO_3$ phosphors were prepared by a traditional solid-state reaction method and their structure, photoluminescence, mechanoluminescence and thermoluminescence were investigated. The results showed that the $LiNbO_3$ phase with a rhombohedral structure and an R3c space group was successfully prepared. Mechanoluminescence intensity in nonstoichiometric $LiNbO_3:Pr^{3+}$ was largely increased by introducing Gd^{3+} ions. The optimal co-doped concentration of Gd^{3+} was 1mol% and the enhanced ML intensity of $LiNbO_3:0.01Pr^{3+}$, $0.01Gd^{3+}$ was about 177% times compared with that of $LiNbO_3:0.01Pr^{3+}$. The effect of Gd^{3+} co-dopants on trap levels were explored through thermoluminescence curves. The enhancement of