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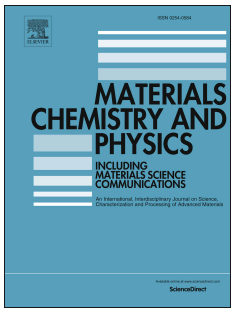

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Effects of Fe_2O_3 content on ionic conductivity of Li_2O-TiO_2-P_2O_5 glasses and glass-ceramics

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Abstract

In this study, Li_2O-TiO_2-P_2O_5-x(Fe_2O_3) (x = 0, 2.5, 5 and 7.5 weight part) glass and glass-ceramics were synthesized through conventional melt-quenching method and subsequently heat treatment. Glass samples were studied by UV-visible spectroscopy and crystallized samples were characterized by differential thermal analysis, X-ray diffractometry and field emission scanning electron microscopy. Besides, electrical properties were examined according to the electrochemical impedance spectroscopy techniques.

Experimental optical spectra of the Fe_2O_3-doped glasses revealed strong UV absorption band in the range of 330-370 nm, which were attributed to the presence of Fe^{3+} ions. The major crystalline phase of the fabricated glass-ceramics was $LiTi_2(PO_4)_3$. However, Li_3PO_4 was also identified as the minor one. Considering the impedance spectroscopy studies, ionic conductivity of Fe_2O_3 containing glasses was higher than that of the base glass. Additionally,