Poster Presentation

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Vitreous and Crystalline Phosphates : elaboration and electrical properties

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Interest in mixed metals titanium phosphates, both in glass and crystalline forms, for their properties as ionic conductors or non-linear optical materials, has led to large number of studies of these materials [1-3]. Our investigation of Na2O – Li2O – CaO – TiO2 – P2O5 system led to the discovery of NaxLiyCazTit(PO4)3 solid solutions which exist in both glassy and crystalline forms. Here the preparation of NaxLiyCazTit(PO4)3 will be described. The compounds were structurally characterized by PXRD, and their chemical and physical characterization were completed using DTA, XRD, UV-visible, Raman spectroscopy and ionic conductivity measurements. NaxLiyCazTit(PO4)3 glasses have been prepared by heating stochiometric amounts of Na2CO3, Li2CO3, CaCO3, TiO2 and NH4H2PO4 in a platinum crucible at 1050 °C. The microcrystalline samples were obtained by crystallization of the corresponding glasses at 640°C or by standard solid state preparation at 700 °C. The values of the characteristic temperatures Tg (glass transition), Tc (crystallization) and Tf (fusion) of the glasses are found in the following ranges: 400 – 500°C for Tg, 440 – 650°C for Tc and 780 – 830 °C for Tf. Rietveld refinements of powder X ray diffraction data collected on crystalline samples of NaxLiyCazTit(PO4)3 shows the existence of a solid solution in the domain $0 \leq X \leq 0.5$ and the presence of a mixture of phases in the domain $0.5 < X \leq 1.5$. The crystalline phases belong to the Nasicon family, space group R32. Their structure, determined from refinement of powder diffraction patterns , consists of a 3D network of AO6 (A = Ti, Na, Li, and Ca) octahedra and PO4 tetrahedra linked by corners. Sodium atoms fully occupy the M(1) sites and partially the M(2) sites.

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