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FLUOROALUMINATE GLASS

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The chemical and thermal conditions of preparation are given. The vitrification, building of crystal phases, chemical and physical properties and structure of these glasses have been studied by different methods (DTA, microscopy, x-ray, spectroscopy: uv, ir, Raman, NMR, measurements of dispersion). The vitrification of pure fluoride glass is low. Eutectical compositions have the best vitrification results. The addition of $M(PO_3)_2/M'(PO_3)_3$ makes the vitrification easier but it dramatically affects the infrared transparency (P-O-overtone at 2 100 cm^{-1}).

In partially crystallised materials crystals of fluorides (CaF_2, MgF_2 ...) and fluoroaluminates ($CaAlF_5$, Ca_2AlF_7, $SrCaAlF_7$, $Sr_{1-x}Ca_xAlF_5$, $SrAlF_5$, Sr_2AlF_7 ...) are obtained. The glasses have a very good chemical stability. The characteristical temperature are: T_g 400 - 450 °C, T_c 450 - 600 °C, T_f 700 - 830 °C. The optical properties of these glasses are remarkable: The transparency is high from the ultraviolet to the infrared. They are characterized by extreme optical position in the n_e-ν_e- and $P_{gF'}$-ν_e-diagrams. The anomalous partial dispersion ($P_{gF'}$) and the n_e/ν_e-position of the fluorspar single crystal is attained and even yet surpassed. A structural model of these glass has been proposed, based on the formation of linear and ramified $(AlF_5)^{2-}_n$- and $(AlF_6)^{3-}_n$- octahedral chains, which are connected by bridging F-atoms, M^{2+}-cations as well as di- and monomere phosphate groups.