Abstract

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Ultraviolet–visible absorption of gamma-irradiated transition metal ions doped in sodium metaphosphate glasses

Spectrophotometric studies of sodium metaphosphate glasses doped with 3d transition metals (0.1% Ti ? Cu) were carried out before and after successive gamma irradiation. In the undoped glass, strong charge-transfer ultraviolet absorption bands are observed and are related to trace iron impurities in the raw materials used for glass preparation. These charge-transfer bands are observed to interfere mask the characteristic ultraviolet bands due to some of the transition metals which possess ultraviolet absorption. Gamma irradiation produces characteristic induced bands in the base undoped and TM doped phosphate glasses. The response of the glasses to gamma irradiation is related to the creation of numerous induced defect color centers, the approach of a saturation condition and the possible photochemical effect on the transition metal ions.