

The effects of some rare earth elements doping on the lattice vibrations of KTP (KTiOPO₄) nanocrystallites synthesized by Pechini method

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Potassium titanyl phosphate due to its properties such as high thermal stability, good mechanical characteristics, transparency over a large wavelength range, large nonlinear coefficients, high damaged threshold and broad angular acceptance, is a standard material in industrial, medical and army applications.[1] KTP is an excellent non-linear optical (NLO) crystal, and one of the most commonly used materials for frequency doubling of Nd: doped lasers.[2,3] During the last two decades, many attempts have been made to improve the properties of KTP family crystals and to develop new applications of KTP. rare earth elements are very attractive to use as doping for KTP.

Studies on KTP have so far been predominantly restricted to single crystals and single phase KTP thin films and very little is reported on the preparation of nanocrystalline powders. Some reports have been studied KTP by Sol-Gel method.[4] The alternative modified Pechini method[5] because of low cost, control of the stoichiometry, its simplicity, low processing temperature, high degree of homogeneity due to the reagents are mixed at the molecular level, has been prepared to Sol-Gel method. In this work we synthesize the nanocrystalline KTP by modified Pechini method. [6] By using the XRD, Micro Raman spectroscopy, UV-Vis and FT-IR spectroscopy, we studied the structure of nanocrystalline KTP. SEM technique used for observation of grain sizes. The Debye-Scherrer formula was used to confirm the grain sizes in SEM slides.

- [1] F.C. Zumsteg, J.D. Bierlein, T.E. Gier, J. Appl. Phys. 476 (1976) 4980.
- [2] J.D. Bierlein, A. Ferretti, L.H. Brizner, W.Y. Hsu, Appl. Phys. Lett. 50 (1987) 1216.
- [3] J.D. Bierlein, H. Vanherzeele, J. Opt. Soc. Am. B6 (1989) 622.
- [4] D. Li, L. Kong, L. Zhan, X. Yao, J. Non-crystalline Solids. 271 (2003) 45-55.
- [5] M.P. Pechini, U S Patent No.3.33. 679 (1967).
- [6] J.J. Carrajal, M. Galceran, M.C. Pujol, F. Diaz, M. Aguilo, 15th International conference on Crystal Growth 12-17 August 2007 Utah USA.