11th International Conference
on Advanced Materials

Rio de Janeiro Brazil
September 20 - 25

ICAM2009

Raman and structural studies on potassium-ammonium dehydrogenate phosphate system

J.F. Jurado*, C. Vargas-Hernández, and J. E. Sánchez

Dept. Física y Química, Universidad Nacional de Colombia-Sede Manizales, Manizales Colombia A.A 127.
e-mail: jfjurado@unal.edu.co
* Corresponding author.

Abstract – Mixed crystals of potassium dehydrogenate phosphate (KDP) and ammonium dehydrogenated phosphate (ADP), were grow at room temperature 25±2°C by evaporation technique from the supersaturated aqueous solution of the mixed of KDP and ADP for ammonium concentration: *x*=0.1, 0.2, 0.3, 0.4. The competitive grow between NH_4^+ and K^+ ions is important factor which leads to the reductions of the grow rate a long the *c*-axis. The Raman spectra mixed crystals showed that of thermal dehydration as in KDP-system associate with H_2O liberates from $KADP_x$, and the content of ammonium decreases the transition temperature

In this work, single crystals of $K_{1-x}(NH_4)_xH_2PO_4$ ($KADP_x$), were grow by slow evaporation technique. Crystals of different compositions were grow by changing the percentage weigh of the KDP and ADP in the solution of the mixed at ambient temperature and pressure. The ammonium concentrations in the mixed solutions were; 0.1, 0.2, 0.3, and 0.4. The starting precursors used in all experiments were analytical grade

The room-temperature X-ray diffraction seem to indicate that the mixed crystal have the same structure as pure KDP (or ADP) but with a lattice constant partway between that of KDP and ADP (Fig.1). Our observation can are agreement with the report in [1].

The spontaneous Raman spectra recorded in the *x(zz)y*-polarizations the scheme for $KADP_x$ are shows in Fig. 2 and Fig. 3 under ambient pressure and function temperature. The observed line shapes reveal appearance of the ν_4 ν_1 modes in the spectra indicates that the local sites symmetry of the PO_4 tetrahedron is C_2, which is the average symmetry of the paraelectric phase (distorted). In these figures, the results indicated that of the extent of thermal dehydratation as in the KDP-type crystals. During the course of dehydration H_2O liberates from the $KADP_x$ structure with the formation of various polymeric intermediates $P_2O_7^{4-}$[2]. On other hand, the high temperature region coexisting mixed phases appear over large temperature range and with the content of ammonia decreases the transition temperature.

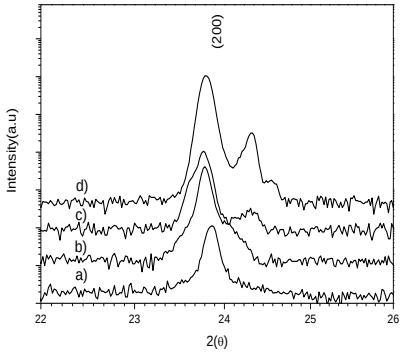

Figure 1: Evolution of X-ray diffraction patterns of $KADP_x$ crystal at room temperature, a) *x*=0.1, b) *x*=0.2 c) *x*=0.3, d) *x*=0.4

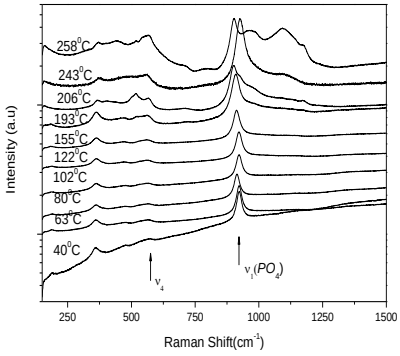

Figure 2: Raman spectra of $KADP_x$ system for x=0.1, take at various temperatures. The internal ν_1 mode of PO_4 vibrations of tetragonal

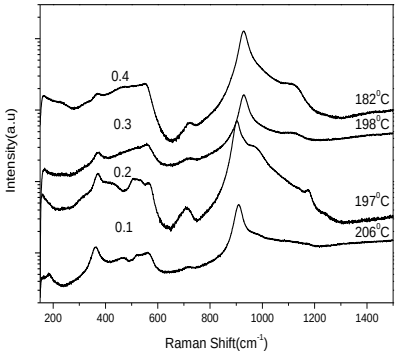

Figure 3: Raman spectra of $KADP_x$ system for *x*=0.1, 0.2, 0.3, and 0.4 take at various temperatures

References

[1] Dongli Xu, Dongfeng Xue, J. Cryst. Growth, 310 (2008)1385
[2]Lee, K.-S., J. Phys. Chem. Solids, 57(1966)333