310 10-Physical and Chemical Properties of Materials in Relation to Structure (Superconductors, Fullerenes, etc)

PS-10.03.17 THE CRYSTAL STRUCTURES AND POLARIZATION PROPERTIES OF LEUCINE AND METHIONINE ENKEPHALINS. By Neeraj Misra, V. D. Gupta, Poonam Tandon & V. P. Gupta* Department of Physics, Lucknow University, Lucknow-226007, INDIA

The crystal structure data of Leucine and Methionine enkephalins being available, attempt has been made to calculate the molecular polarizabilities and other electro optical properties of these opioid penta peptides. Theoretically, the polarizability values have been calculated with the help of Atom Dipole Interaction Model which takes into account the various bonded and nonbonded interactions via dipole-dipole interactions and is therefore conformation dependent. In this method the results are dependent on atomic polarizability and positional coordinates of atoms and show conformational dependence. In the present work the theoretical results are compared with those obtained from experimentally measured molar refraction data.

PS-10.03.18 A NEW METHOD FOR DETERMINATION OF OXIDES SOLID SOLUTION LIMITS. BY X.L.Chen, J.K.Liang, S.S.Xie, W.X.Yuan*, X.R.Xing* and Z.Y. Qiao*, Institute of Physics, Chinese Academy of Sciences, Beijing 100080, P.R.China. * Department of Physical Chmistry, University of Science and Technology Beijing, Beijing 100083, P.R.China

A new method for determination of solid solution limits for high Tc superconductors and related materials have been presented. The method is based on analysizing the variations of oxygen contents vs substitutions for oxdies solid solutions in terms of both theoretical derivations and experiments. It has been found that for continuous solid solutions, their oxygen contents vary with the substitution in a linear manner over the entire substituting regions, while for discontinuous solid solutions, their first derivatives of the oxygen contents with respect to the substitution discontinues at the solid solution limits. For the latter type of solid solutions, the oxygen contents vary in the same way as continuous solid solutions with the substitution within the solution limits, however, beyond the solid solution limits, oxygen contents vary with the substitution either in a liner manner but with a different slope or in a curve-like manner, depending on the properties of the component elements of the solid solutions. Therefore, we can determine the solid solution limit from the plot of the variation of oxygen contents with the substitution. Experiments on the determination of the oxygen contents for $Bi_2Sr_2Ca_{1-x}Y_xCu_2O_y$, $Pr_{1-x}Ca_xBa_2Cu_3O_y$, $Sm_{1+x}Ba_{2-x}Ba_2Cu_3O_y$ by iodometric titration have verified the above conclusions. The solid solution limits determined by our method are in good agreement with the ones by the powder x-ray diffraction. Fig.1 shows the the variations of oxygen with the substituion of Ca for Pr for the solid solution $Pr_{1-x}Ca_xBa_2Cu_3O_y$. It can be easily determined that the solution limit x_0=0.4 from fig.1. The solution limit determined by powder x-ray diffraction is 0.45. The solution limits determined for $Sm_{1+x}Ba_{2-x}Ba_2Cu_3O_y$ sintered in air and flow oxygen are 0.37 and 0.4 respectively, which also are in good agreement with the results determined by powder x-ray diffraction. In some cases where inonic raduii of the substituting and substituted ions are close in size, the present method has advantages over the conventional powder x-ray diffraction in determining the solid solution limits.

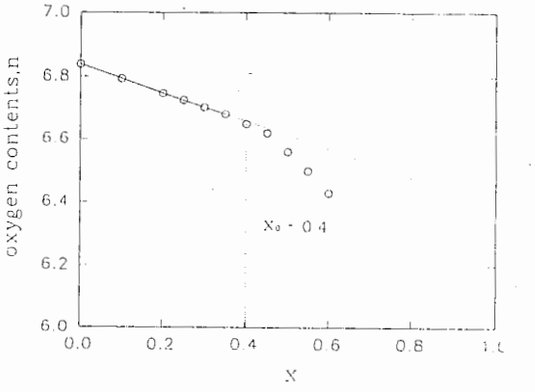

Fig.1 The variation of the oxygen contents vs the substitution of Ca for Pr in $Pr_{1-x}Ca_xBa_2Cu_3O_y$, x_0=0.4 is the solid solution limit

PS-10.03.19 SEARCH FOR NEW SCINTILLATORS USING FLUORESCENCE OF POWDERS UNDER SYNCHROTRON RADIATION by Chen Yu[1],Go Yifan[1], Liu Jianfei[1], Wang Dewu*[1], Xic Yaning[1], Sun Hancheng[2], ZhangJianshan[2] and Zhu Zuqi[2], [1]Institute of High-Energy Physics, Academia Sinica, P.O. Box 918, Beijing 100039, China; [2]Institute of Atomic Energy, P.O.Box 275, Beijing 102413, China

In view of the need for scintillation materials with improved properties for precision electromagnetic calorimeters in next generation high energy physics experiments, an experimental program has been initiated at Beijing Synchrotron Radiation facility to search for new scintillator candidates by using synchrotron radiation x-rays for measuring the fluorescence properties of powdered compounds instead of by first growing crystals of suitable quality and size.

The experiments are performed on the beam line 4W1B at EXAFS station, exciting the sample with 20.8Kev X-rays, the single photoelectron rate is measured by a XP2020Q phototube with a quartz window. To obtain the fluorescence intensity, the measured rate is corrected for the average phototube background rate as well as the absorption of fluorescent photons, and normalized to a BGO sample of lifetime are also made using the delayed coincidence technique. A single photoelectron pulse from the XP2020Q phototube is used to start a time-to-amplitude converter (TAC). The following x-ray burst (800nS later) produces a trigger pulse from a plastic scintillator and XP2020 phototube detector that stops the TAC. A sum of exponentials plus a flat background are fitted to the time delay distribution. The fluorescent intensity of 11 samples and fluorescent lifetimes for 4 typical known scintillators were measured. These first results demonstrate the feasibility of the method as well as its quite high sensitivity.

More samples have been prepared and will be studied in the forthcoming runs.

