Anomaly of structural properties in PMN at low temperatures. A.R. Lebedinskaya, M.F. Kupriyanov. Department of Physics and Chemistry, Azov - Black Sea State Agro - Engineering Academy, Zernograd, Rostov Region, 347720, Russia. Department of Physics, Rostov State University, Rostov-on-Don, 344104, Russia. E-mail: lebed@zern.donpac.ru

Results of series of X-ray analysis studies of lead magnesium niobate PbMg$_{1/3}$Nb$_{2/3}$O$_3$ (PMN) single crystal are presented. It was studied in detail at the temperatures of 103 K, 183 K, 203 K that below a temperature of the diffuse dielectric permittivity maximum (T$_m$). In our investigation we observed the abnormal decrease of a cell parameter in PMN at the temperatures of 183 and 203 K. The analysis of the electron density distribution in PMN showed the anisotropy of the electron density distribution for the O atoms at low temperatures especially at 183 K and 203 K too. In our opinion, the possible reasons for the anomaly in the temperature dependence of lattice parameters below T$_m$ at a relaxor ferroelectric phase transition in PMN may be the weakening of a long interaction in the electron crystal sublattice, which are a cause of the decrease of a radius of correlation interaction and leads to a relative “release” of rotational modes of vibrations that is accompanied by the coordinated rotations of oxygen octahedra BO$_6$. It is quite evident that at the such rotations of octahedra the O-B-O-B-O chains become zigzag and the mean lattice parameters (interatomic distances B-B) decrease. In this case, the relaxation rotations of oxygen octahedra BO$_6$ (second - order phase transition) are possible in the vicinity of T$_m$ are a cause for the appearance of superstructure. Also it has been established that the disorder in shifts of Pb atoms below T$_m$ develops successively with lowering temperature and correlates with the shifts of O atoms and effect of Mg?Nb ordering.

Synthesis of La$_{1-x}$Ca$_x$MnO$_{3-\delta}$ by wet chemical routes. C. Vázquez-Vázquez, S. Dosiil-Caamaño, M.A. López-Quintela. Universidade de Santiago de Compostela. Facultade de Quimica. Departamento de Quimica Fisica. Avenida das Ciencias, s/n. E-15706 Santiago de Compostela (Spain).

La$_{1-x}$Ca$_x$MnO$_{3-\delta}$ perovskites (with x= 0 and 0.33) have been prepared by two different wet chemical routes:

1. A sol-gel process using urea as gelifying agent. Ions remain randomly distributed into the structure of the gel and the crystallization of the La$_{1-x}$Ca$_x$MnO$_{3-\delta}$ perovskites occurs around 500-600 °C.

2. A method starting from the synthesis of potassium hexacianomanganate(III) and afterwards precipitating the corresponding La$_{1-x}$Ca$_x$-hexacianomanganate(III) from an aqueous solution. Thermal decomposition of this complex at different temperatures leads to the crystallization of La$_{1-x}$Ca$_x$MnO$_{3-\delta}$ perovskites.

Samples were characterized by x-ray, and structural and microstructural information were extracted using the Rietveld method. Oxygen content was determined by iodometric titration and particle size was determined by transmission electron microscopy.

A comparison of the physicochemical properties of the samples obtained by the two chemical routes will be presented.