

PRODUCING OF PLZT POWDERS BY TWO-STAGE CHEMICAL METHOD.

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The processing of electroceramics by means of chemical solutions has become increasingly important especially in the producing transparent $\text{Pb}_{1-x}\text{La}_x(\text{Zr}_{0.65}\text{Ti}_{0.35})\text{O}_3$ (PLZT) ceramics of large size.

We have worked out original two-stage co-precipitation method from mixed solution of inorganic salts, as follows: $\text{ZrOCl}_2 \cdot 8\text{H}_2\text{O}$, TiCl_4 , $\text{La}(\text{NO}_3)_3 \cdot 6\text{H}_2\text{O}$, $\text{Pb}(\text{NO}_3)_2$, which are commercially easy available and cheap. At the first stage hydroxopolimer of TiO_2 - ZrO_2 - La_2O_3 is obtained by co-precipitation from mixed solution of corresponding metallic salts by 10% NH_4OH . In result "dry" curds, snow-like deposit was obtained (without any liquid phase). After it thermal decomposition at 1000 °C for 4 h white powder of above mentioned oxides (TiO_2 , ZrO_2 , La_2O_3) was obtained.

At the second stage PbO was introduced in powder produced at the first stage of reaction by milling in $\text{Pb}(\text{NO}_3)_2$ solution for 10 h. After co-precipitation of obtained suspension by mixture of NH_4OH and H_2O_2 the deposit of peroxohydroxopolimer was produced. After filtration the deposit by waterpump and thermal decomposition at 600 °C for 4 h we have obtained PLZT powder of desired composition with perovskite structure.

Transparent PLZT ceramics of large size were produced by two-stage hot pressing sintering. The first stage was performed at 930 ° – 980 °C for about 1 h in forvacuum at 20 MPa pressure. The second stage was performed at 1150°-1200 °C for 1 ÷ 40 h depending on size (15 ÷ 90 mm of diameter) at pressure 20 MPa in air or rich in O_2 atmosphere.

The optical transmittance of ceramic plates (thickness 0.3 mm) measured at wavelength of 630 nm reached 67 - 69 %.

Depending on thermal regime and size of samples 1.0 ÷ 6.0 wt.% of overstoichiometric PbO was added.