"Nanocomposites and nanomaterials"

Sol-gel synthesis and conductivity $NaLn_9(SiO_4)_6O_2$

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Silicates rare earth elements (REE) with the structure of the apatite may find practical use as solid electrolytes, it is known that in average temperatures anionic conductivity in them than in the modified zirconium dioxide. But their synthesis and sintering requires high temperatures (about 1300°C and 1750°C respectively), so there is interest in the study of double sodium silicate REE and which require much lower temperatures.

However, solid-phase, mechanochemical and hydrothermal method had not been able to obtain compounds $NaLn_9(SiO_4)_6O_2$, suitable for making pottery because of uncontrolled sublimation under Na_2O [1] no single-phase samples [2] and the deviation from the set of predetermined composition [3]. So we used sol-gel method for the synthesis of nanoscale compounds $NaLn_9(SiO_4)_6O_2$ by hydrolysis of sodium tartrate solution and rare earth metals from tetraethoxysilane $Si(OC_2H_5)_4$. Since polycrystals obtained at 1100°C ceramics produced sufficient density to measure electrical conductivity. It is established that the electrical conductivity at 700°C has the same order as the most-apatite REE silicates without alkali metals. In addition, double-yttrium silicate subgroups is less than cerium several times, due to the smaller radius apatite channels on which carriers move. Yes, the distances Ln(2) -Ln(2) where Ln - Nd, Eu, Gd and Ho specification for the structure are 3,94 ; 3.87; 3,85 та 3.81 Å.

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