Selected Abstracts from *Yogyo-Kyokai-Shi*

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Preparation and Several Properties of Ferroelectric Powder Pb{(Mg, Zn)$_{1/3}$Nb$_{2/3}$}O$_3$ (Part 2)

Stability of Perovskite Type Double Oxide Pb{(Mg, Zn)$_{1/3}$Nb$_{2/3}$}O$_3$ Prepared Through the Solid State Reaction

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A ferroelectric powder consisting of perovskite type single phase (100% -perovskite powder) could be prepared by firing a batch mixture containing an excess amount of MgO and/or ZnO in the series $Pb(Mg_{1/3}Nb_{2/3})O_3$-$Pb(Zn_{1/3}Nb_{2/3})O_3$. As for the excess amount, the following conditions were needed: $x+y \geq 1.4$ and $x \geq 1.0$ when the composition of a batch was represented in the chemical formula $Pb\{(Mg, Zn)_{1/3}Nb_{2/3}\}O_x$. In order to prepare a mono-sheet capacitor from ferroelectric powders, addition of a small quantity of glass is necessary as a bonding agent. The perovskite type niobate in this series, however, is apt to be decomposed to a pyrochlore type compound and the ferroelectricity is lost in the presence of glass during firing. Accordingly, inert glasses for the perovskite type niobate have been requested. In this report the effects of oxides on the decomposition were investigated by adding 10% various oxides to the 100% -perovskite niobate powder one after another, firing at 850°C for half an hour and determining the perovskite fraction. It was shown that the oxides of multi-valent metal or "acidic oxides" accelerated the decomposition of the perovskite phase and that the oxides of divalent metals were inert. Probable reasons of these phenomena were discussed on the basis of the crystal structure and the single bond strength of the oxides. On the basis of the experimental results, inert glasses were searched. Several glasses in the system PbO-Bi_2O_3-SiO_2 were found to be promising for practical use. A glass composition, 35 PbO·60 Bi_2O_3·5 SiO_2 (in mol %) has been recommended.

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