

بسم الله الرحمن الرحيم



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شبكة المعلومات الجامعية التوثيق الالكتروني والميكرو فيلم



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جامعة عين شمس

التوثيق الإلكتروني والميكروفيلم

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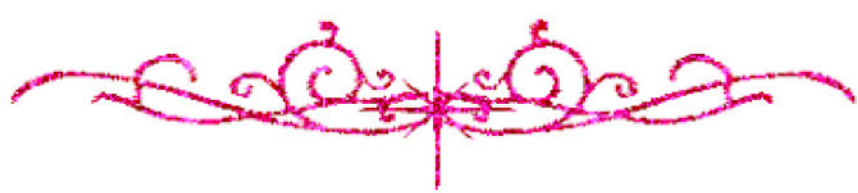
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بالرسالة صفحات

لم ترد بالأصل



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**EFFECT OF LANTHANA AND NIOBIA ADDITIVES ON
THE PHYSICAL PROPERTIES OF BARIUM TITANATE
CERAMICS**

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A thesis

Submitted for the Degree of M. Sc in Physics

By

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To

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SUMMARY AND CONCLUSIONS

SUMMARY AND CONCLUSIONS

Barium titanate has been used as a multilayer ceramic capacitor due to its high dielectric constant and low dielectric loss. The aim of the present work is to investigate the effect of lanthanum oxide (La_2O_3) and niobium oxide (Nb_2O_5) additives on the physical properties of the ceramic BaTiO_3 . Samples were prepared, using the ceramic technique, to obtain the composition $\text{BaTiO}_3 - \text{La}_2\text{O}_3 - \text{Nb}_2\text{O}_5$ (with $\text{Nb}_2\text{O}_5 = 0.1 \text{ wt } \%$ and $\text{La}_2\text{O}_3 = 0.0, 0.1, 0.2, 0.3$ and 0.4). The investigation included the study of the effect of La substitution and temperature on various properties. The structure of the samples have been confirmed by X-ray diffraction showing that beside the main tetragonal phase, there is a new phases due to the inhomogeneity of the dopants during preparation method. The lattice parameter, the density, X-ray density and porosity are determined as a functions of composition.

The dielectric constant have been measured in a wide range of temperature from room temperature to 200°C for all compositions at constant frequency 1 KHz , also dielectric loss have been measured at the same frequency (1 KHz) from room temperature to 160°C .

D. C. Resistivity have been measured in the temperature range $60 - 200^\circ\text{C}$.

Thermal conductivity have been measured under vacuum from room temperature to 200°C . The main conclusions can be summarized as follows :

- 1- The axial ratio (c/a), at room temperature, decreases initially with increasing lanthanum content up to $X=0.2$ and then increases, this is due to La ions initially enter the lattice replacing Ba ions causing an increase in a parameter,