YUCOMAT XII, Sept 6-10, 2010, Herceg Novi, Montenegro

Structural and Electrical Properties of Barium-Zinc-Titanate Ceramics Sintered at 1300°C

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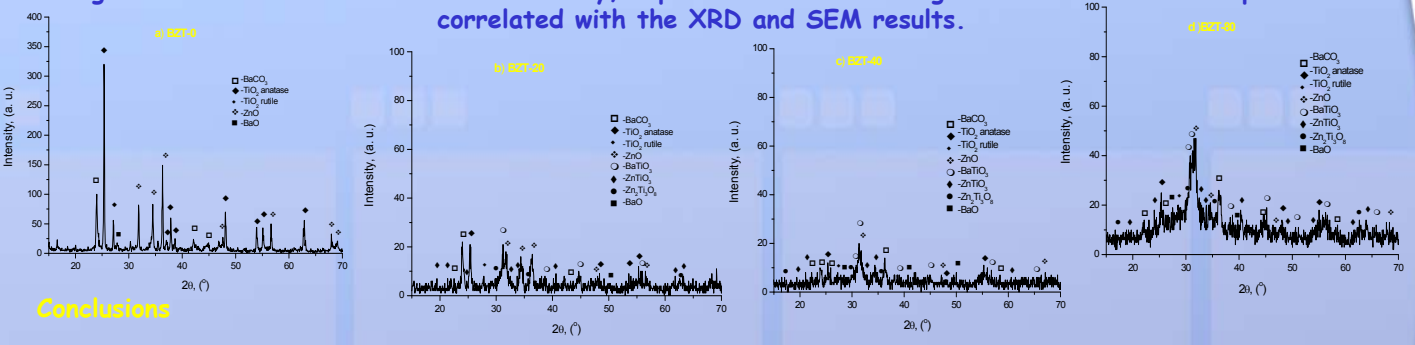
Abstract

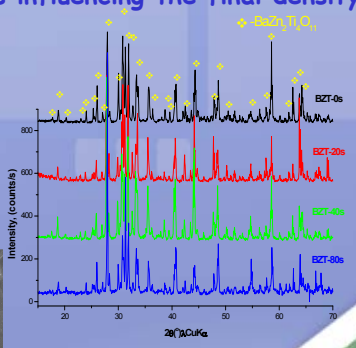
The aim of this work was an investigation of structural and electrical properties of sintered barium-zinc-titanate ceramics. Mixtures of $BaCO_3$, ZnO and TiO_2 were mechanically activated in a planetary ball mill up to 80 minutes and sintered isothermally in air for 120 minutes at 1300oC. The phase composition in the $BaCO_3$-ZnO-TiO_2 system after milling and sintering was analyzed using the XRD method. The existence of pure barium-zinc-titanate has been registered. Microstructure analyses were performed using SEM. The results of electric resistivity, capacitance and loss tangent of the sintered samples were correlated with the XRD and SEM results.



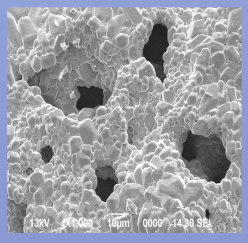
Conclusions

The influence of mechanical activation of the $BaCO_3$-ZnO-TiO_2 system on structural and electrical properties of sintered barium-zinc-titanate ceramics has been examined. It was noticed that the first significant appearance of barium-titanate phase along with all the starting phases is established to be after 20 minutes of mechanical treatment. A pure barium-zinc-titanate phase in all samples has been synthesized successfully after the sintering process. Microstructure analyses showed that mechanical activation led to the increase of contact necks and strengthening of boundary regions of neighboring grains thus influencing the final density and electrical properties of the samples.

Sample	ds(%TD)	εr	Q	tanδ·10-3	ρ(Ωm)
BZT-0	70.42	4.18	92.98	10.75	4.45
BZT-20	92.37	4.46	82.61	12.11	3.87
BZT-40	91.90	5.17	56.06	17.84	6.81
BZT-80	93.12	5.52	123.09	8.12	3.11



BZT-0



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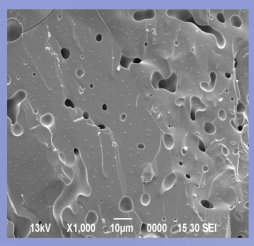

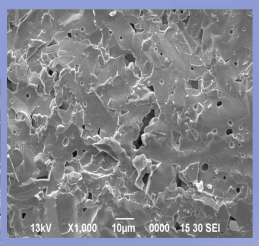

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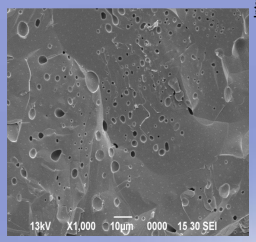

BZT-80

Acknowledgment
This research is part of Project F-7 of Serbian Academy of Sciences and Arts and Project 142011 G of Ministry for Science of the Republic of Serbia.