

Surface Morphology of Ca Doped Li_{0.5}Bi_{0.5}Fe_{0.5}Nb_{0.5}O₃ Perovskite

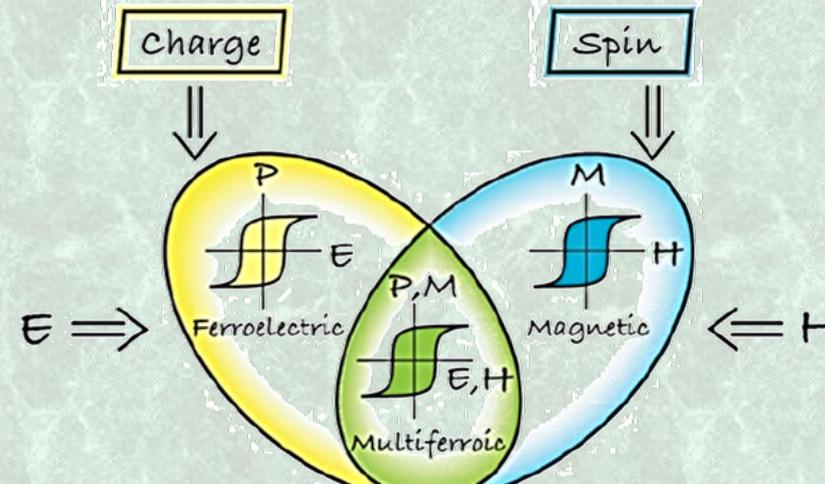
M. A. Rashid*, K. A. Rahman* and A.K.M. Akther Hossian**

*DSHE, Ministry of Education Bangladesh, Dhaka.

**Department of Physics, Bangladesh University of Engineering and Technology, Dhaka.

Introduction

- Multiferroics are multifunctional materials that exhibit more than one ferroic order in the same phase [1].



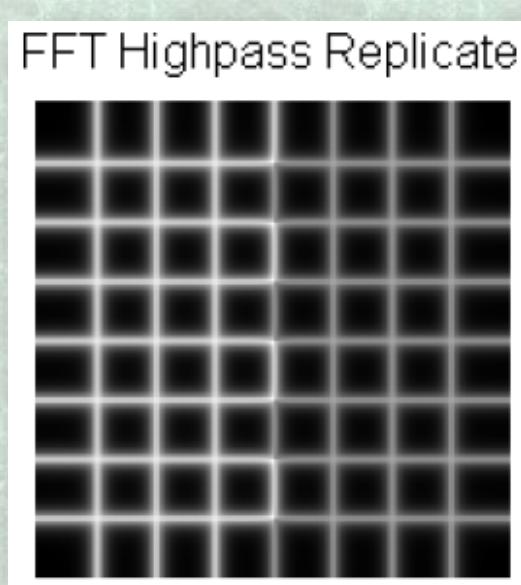
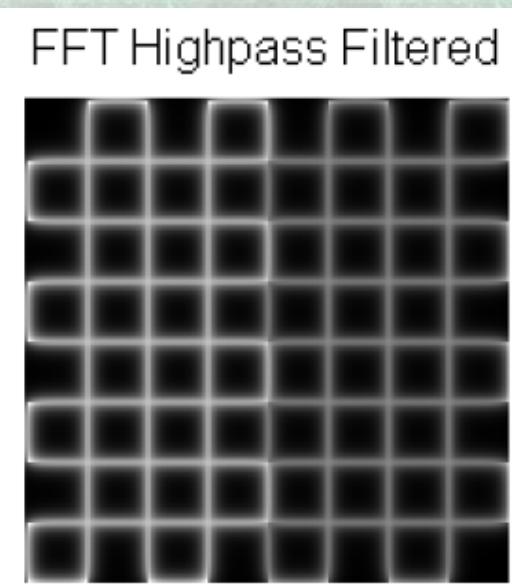
Applications

- In recent years, multiferroics have been drawing the attention of researchers due to their potential technological applications in the area of Spintronics, Information storage, Sensing & Imaging [2].



Computer Vision

- The "Computer Vision" science deals with how computers can be made for gaining high-level understanding from digital images or videos.
- It allows a much wider range of algorithms to be applied to the input data and can avoid problems such as the build-up of noise and signal distortion during processing.
- Digital Filter can perform in the spatial domain by complexities with specifically designed kernels (filter array), or in the frequency (Fourier) domain by masking specific frequency regions [3].

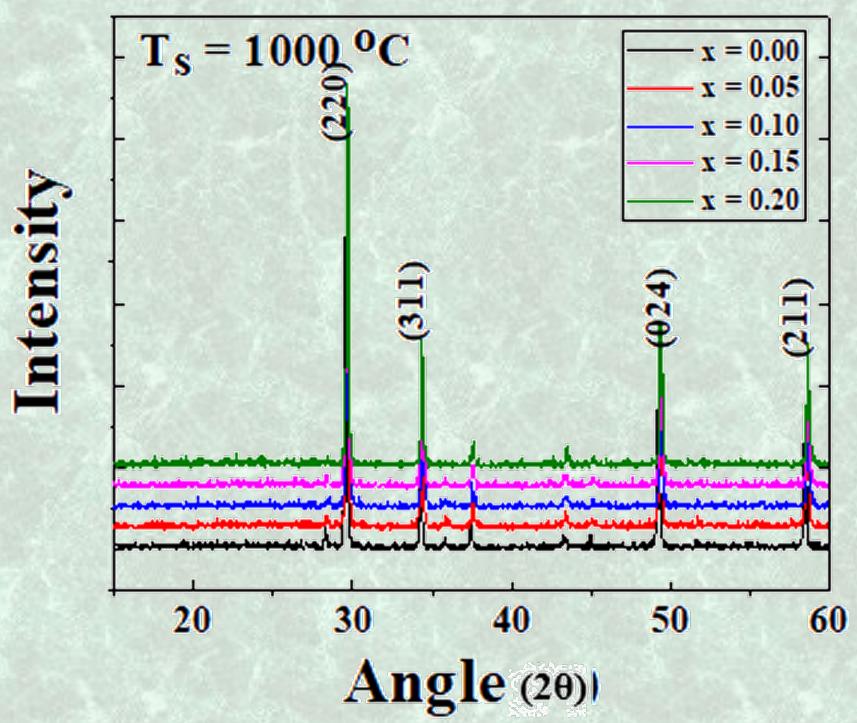


Objectives

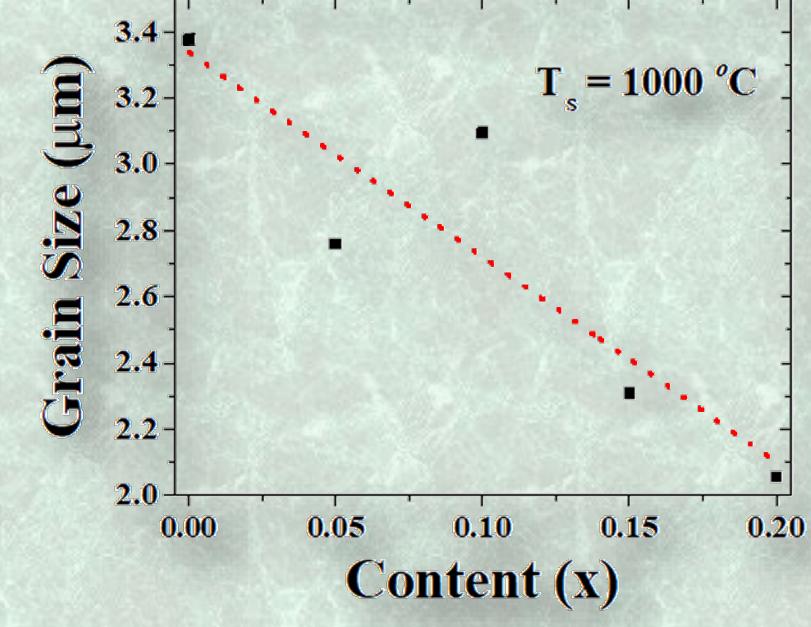
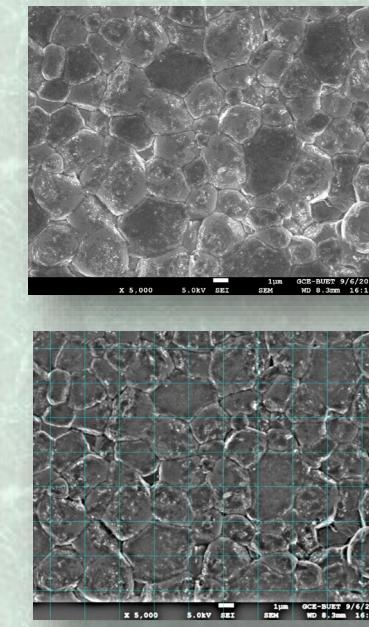
- Synthesis of Ca_x(Li_{0.5}Bi_{0.5})_{1-x}(Fe_{0.5}Nb_{0.5})O₃, where x = 0.00, 0.05, 0.10, 0.15 and 0.20.
- Study of crystal structure of various samples by X-ray diffraction.
- Investigation of surface morphology using Scanning Electron Microscopy (SEM) and determination of grain size by Image processing technique.
- Investigation of Permeability and Dielectric properties.

Results

XRD confirms formation of crystal.

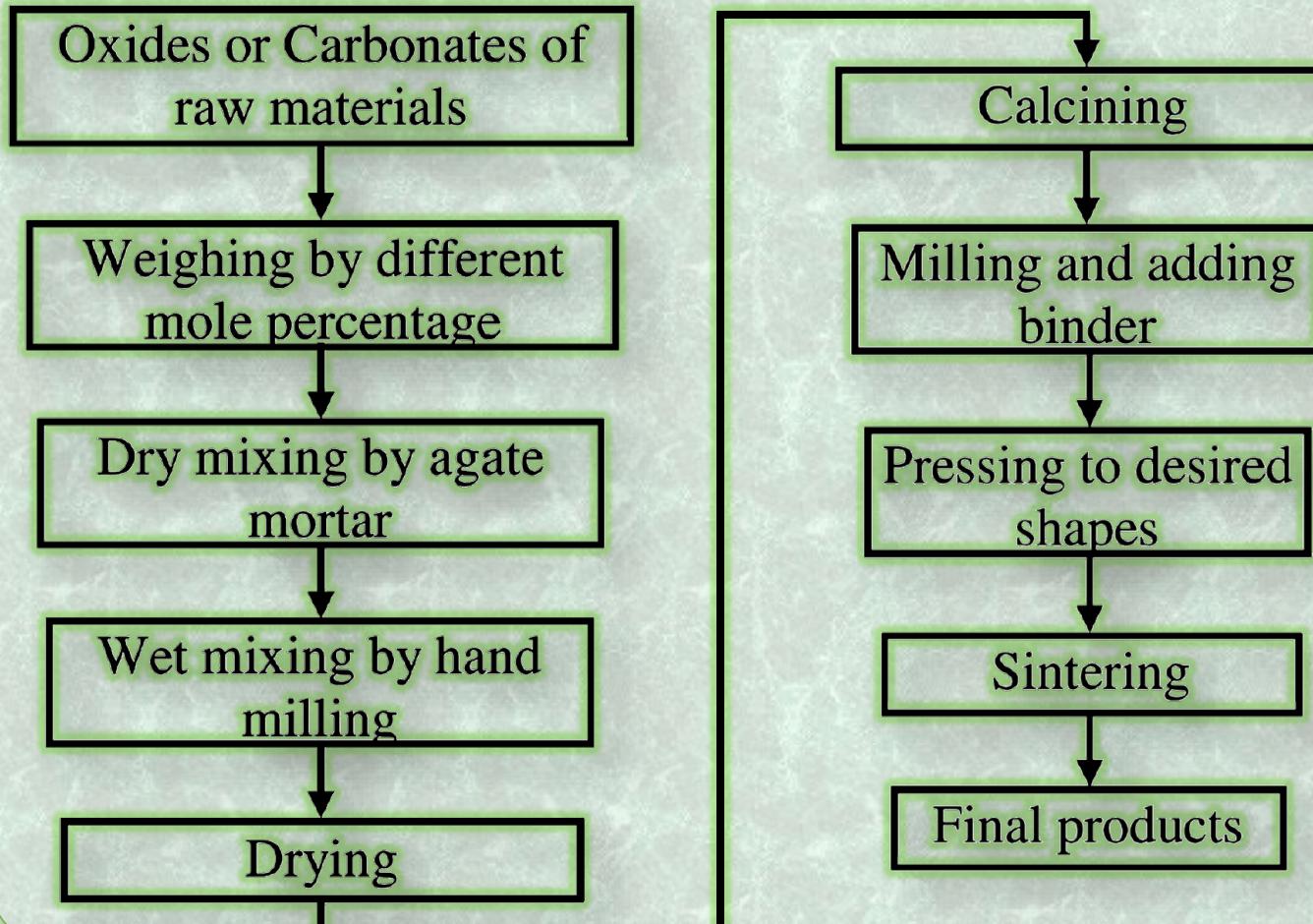


- First one is original images, and consequent bellow is processed image.
- The average grain size is 3.34 μm with standard error 0.21.

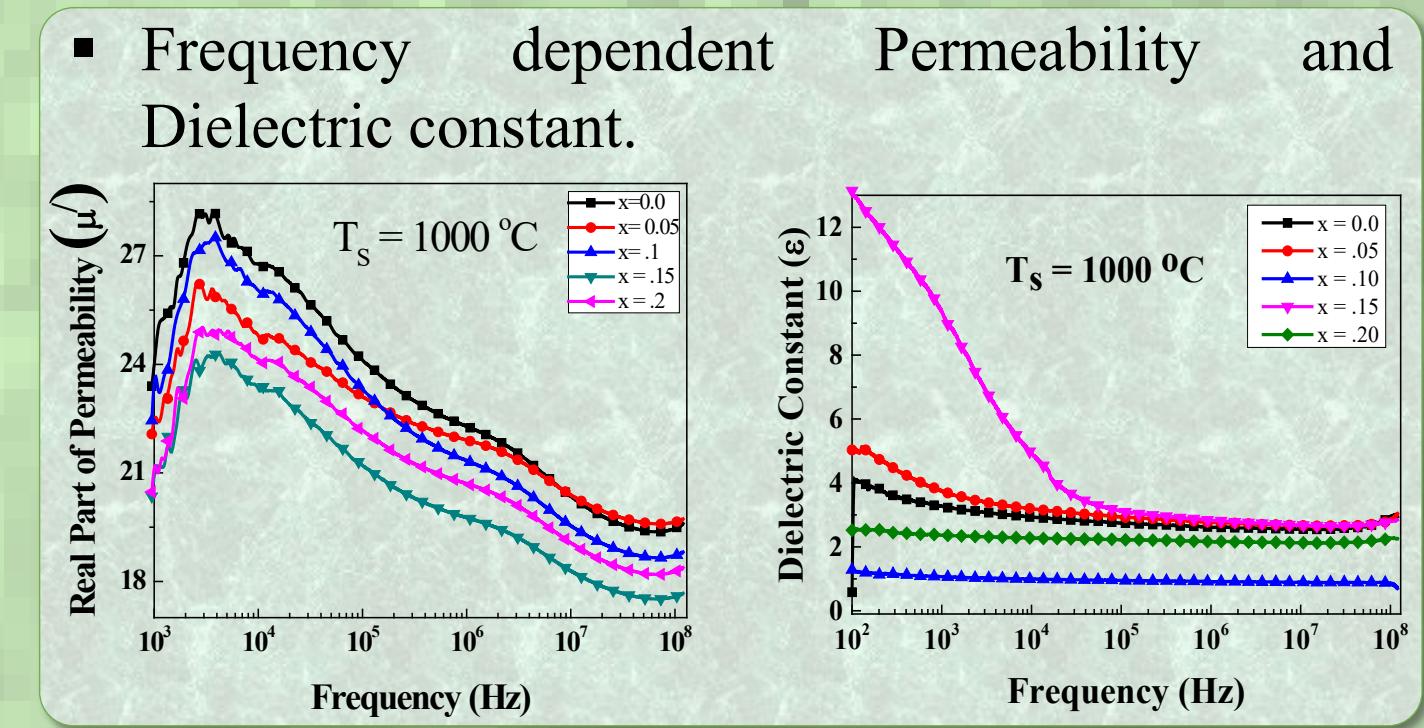
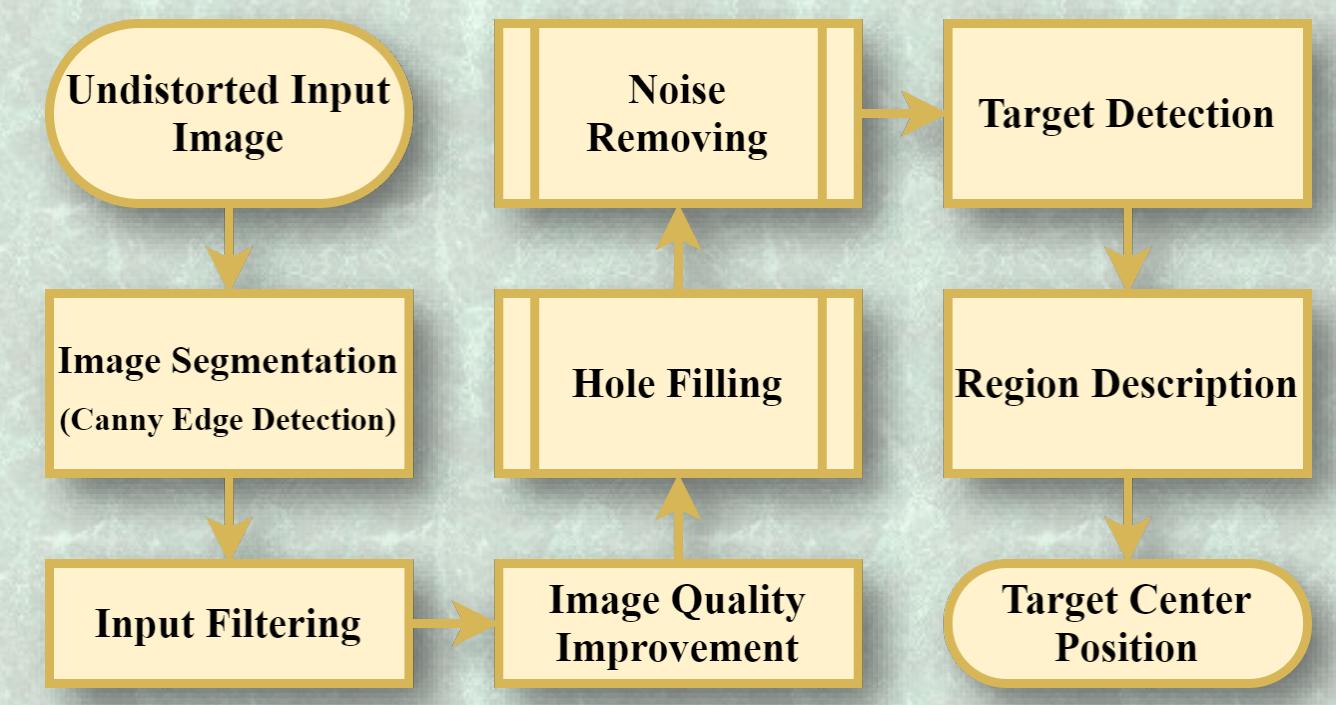


Experimental Methods

- Fabrication of Solid Solution of Ca doped LBFNO



- Apply Image Processing Algorithm with Band Pass Filter on digital SEM image for shading correction and edge detection.



Conclusions

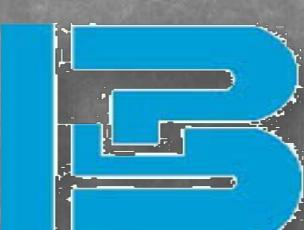
- The Bragg reflections are observed mainly perovskite structure with some secondary phases.
- Grains are well formed for the sample sintered at 1000 °C.
- Permeability decreases due to Ca doping.

References

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