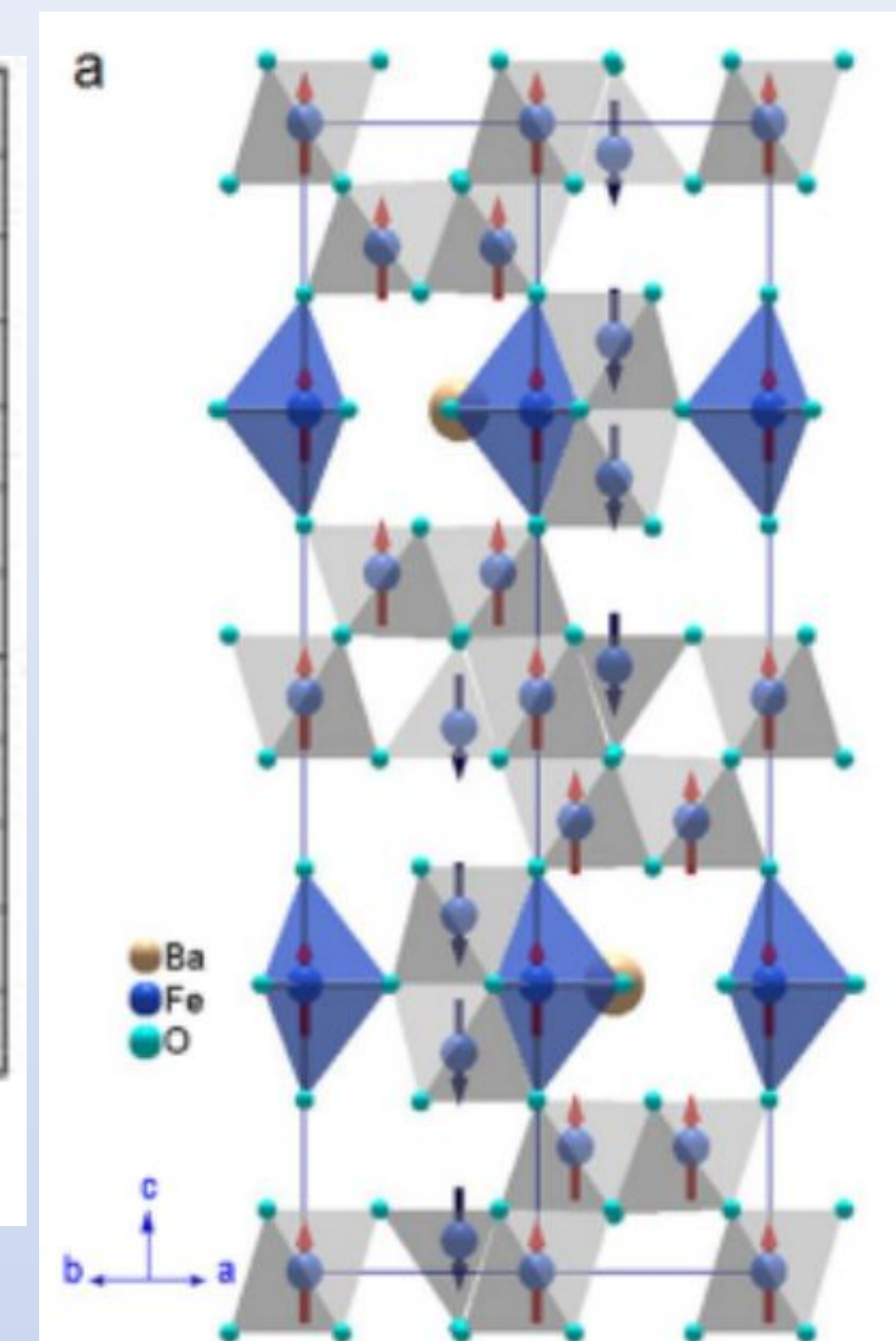
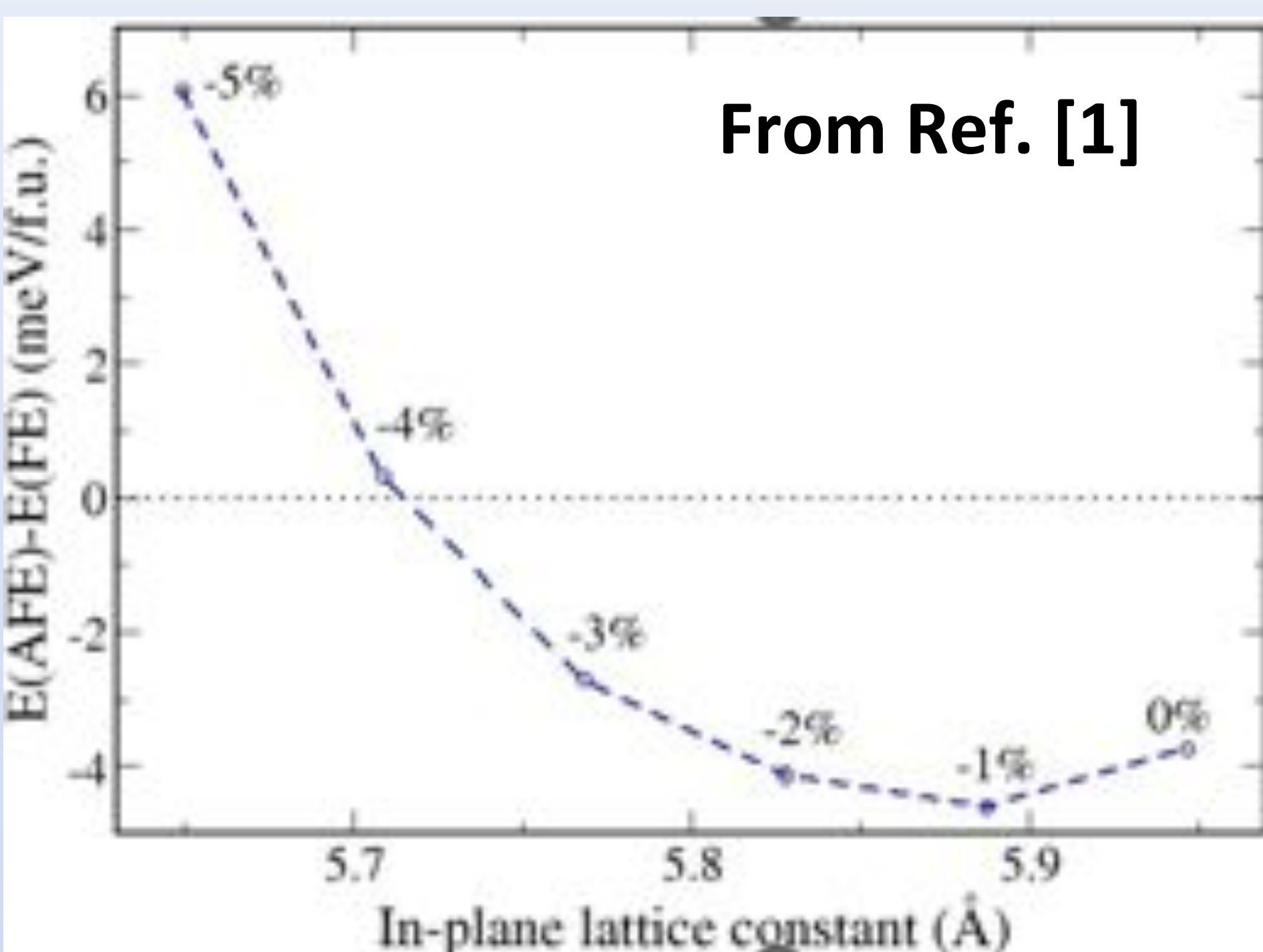
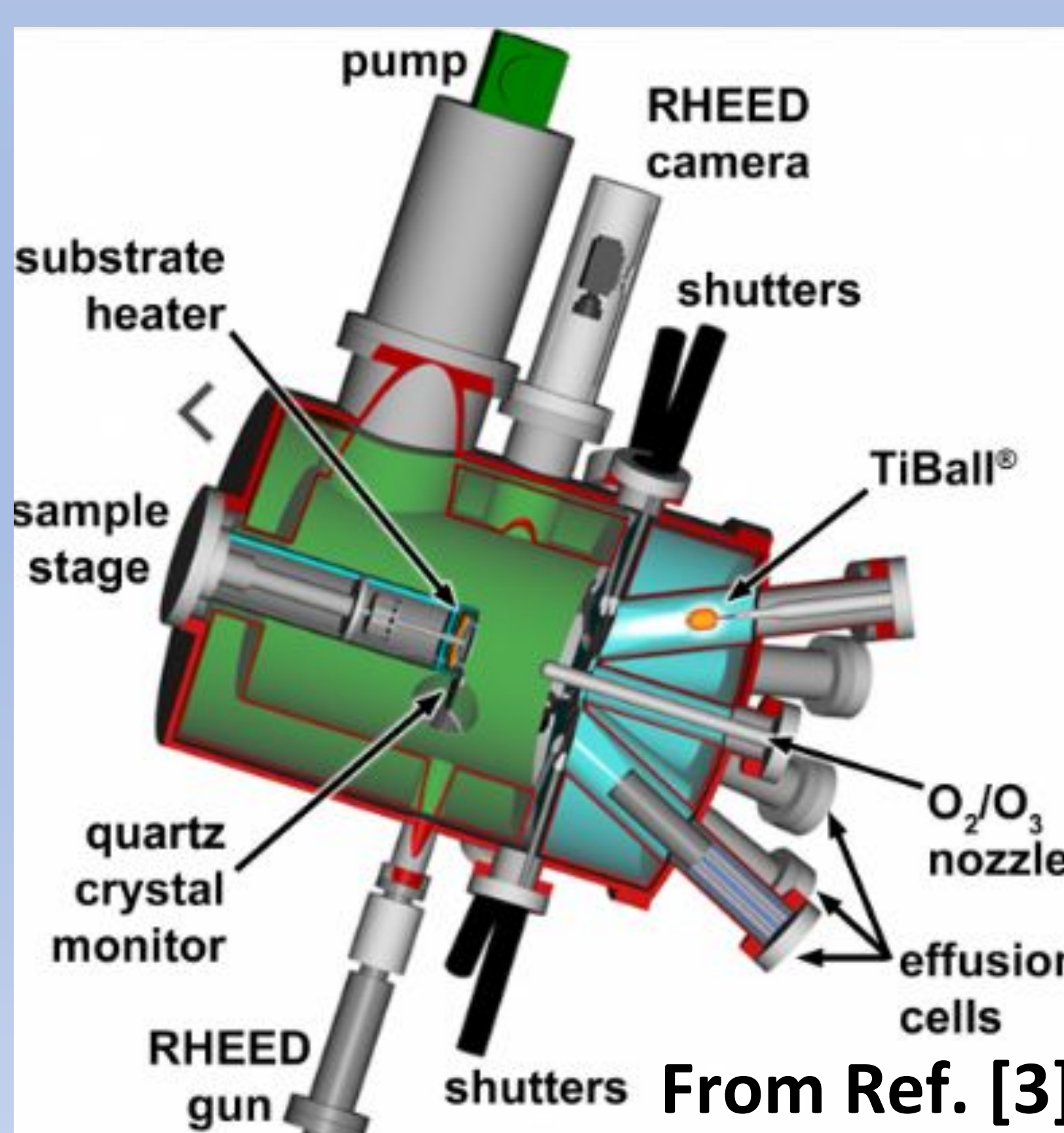


I. Introduction



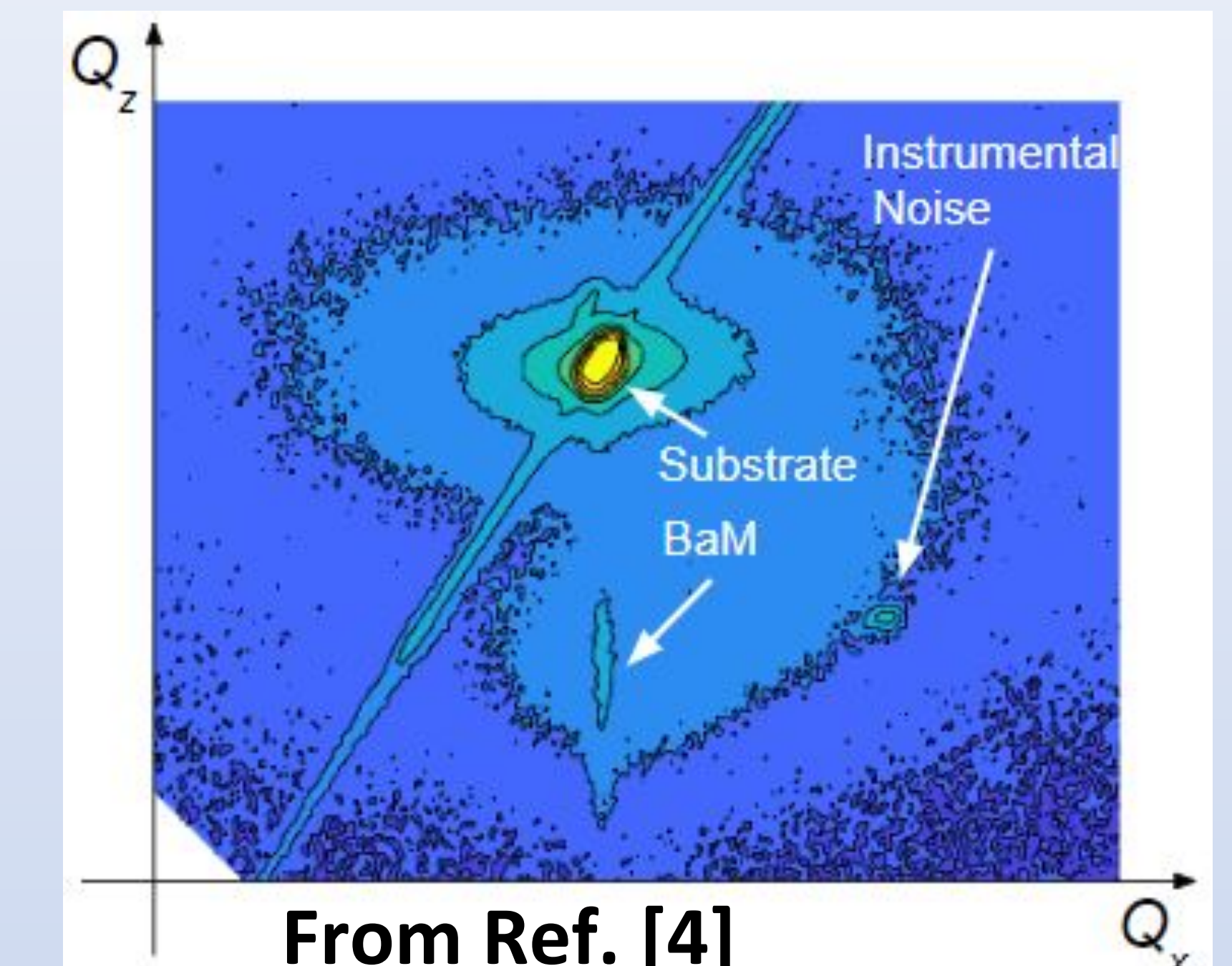
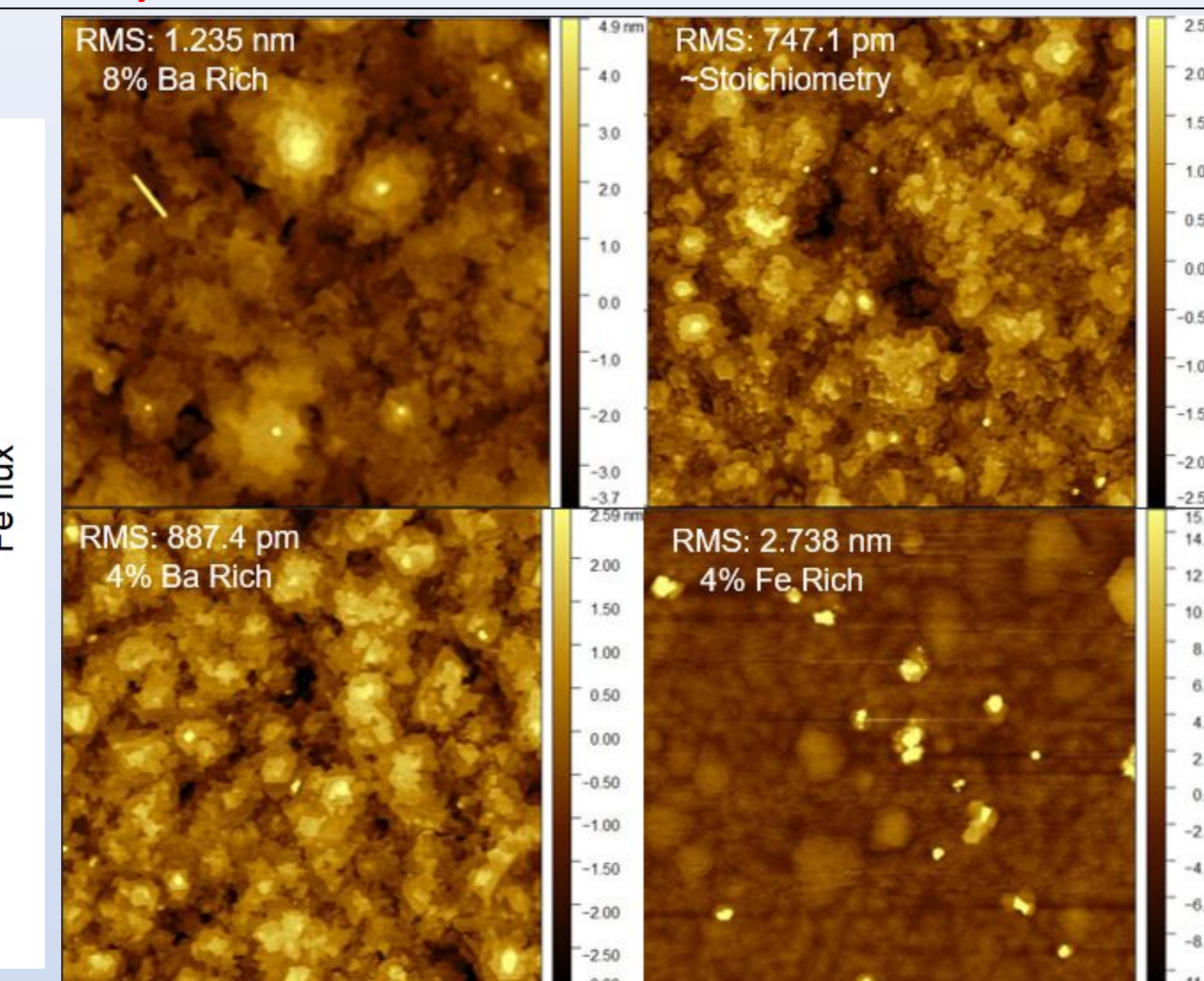
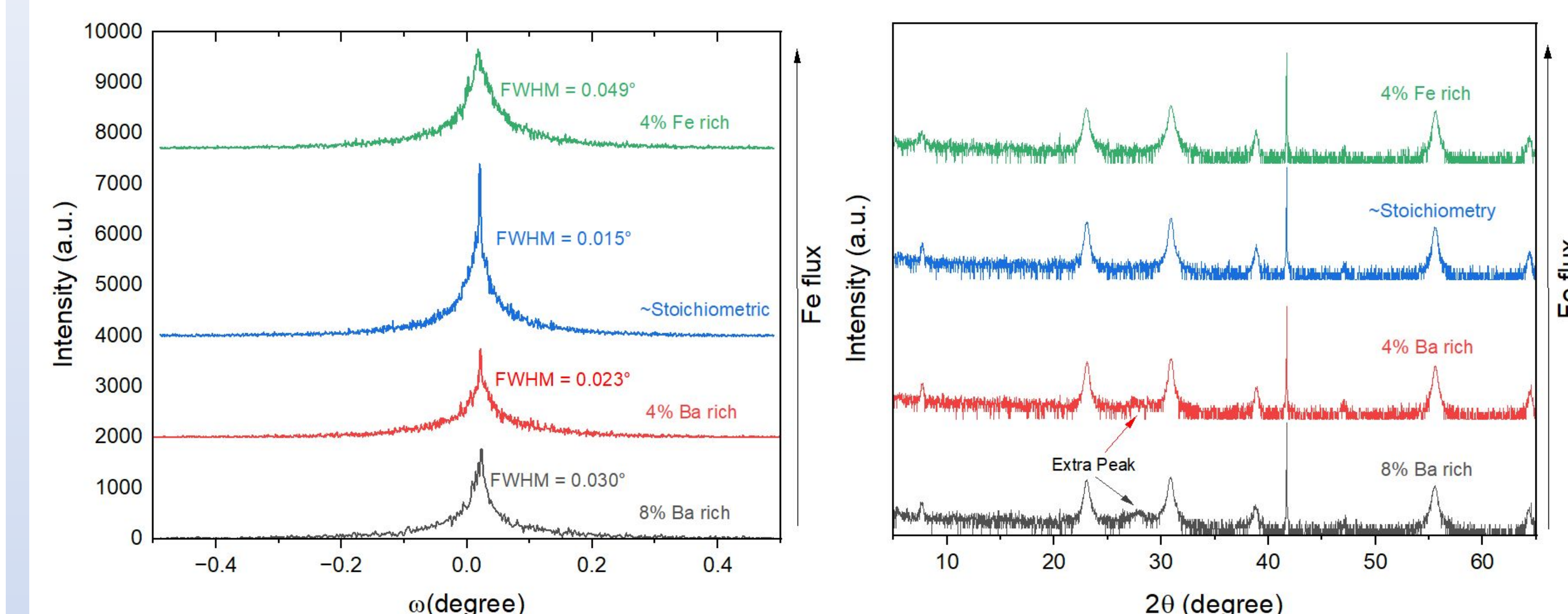
Barium hexaferrite ($\text{BaFe}_{12}\text{O}_{19}$, BaM) is a ferrimagnetic insipient ferroelectric material typically used in magnetic credit cards, barcodes, refrigerator magnets. BaM proves to be a promising material in utilizing electric-field control of magnetism in ultra-low power, memory, or logic devices.

II. Method

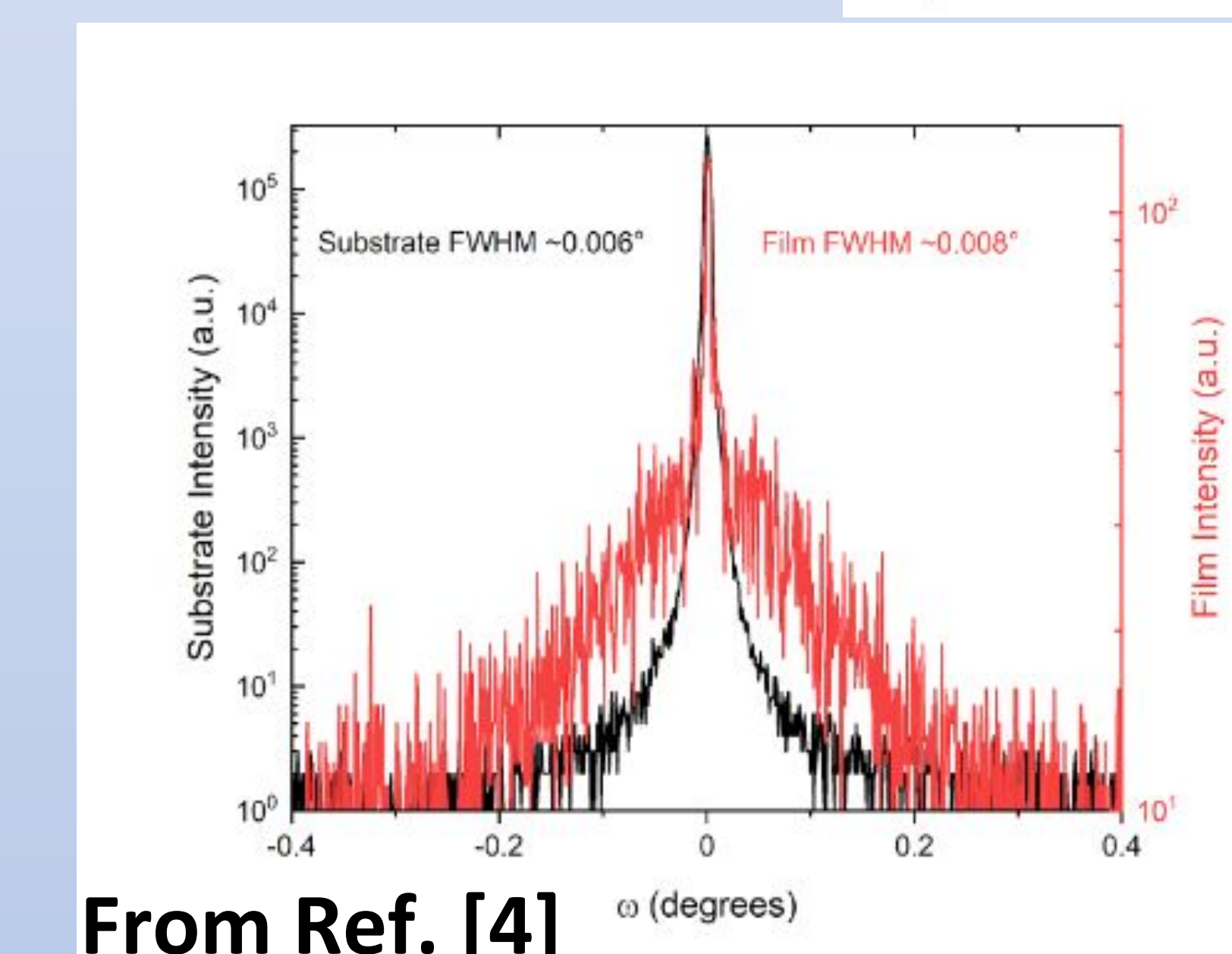
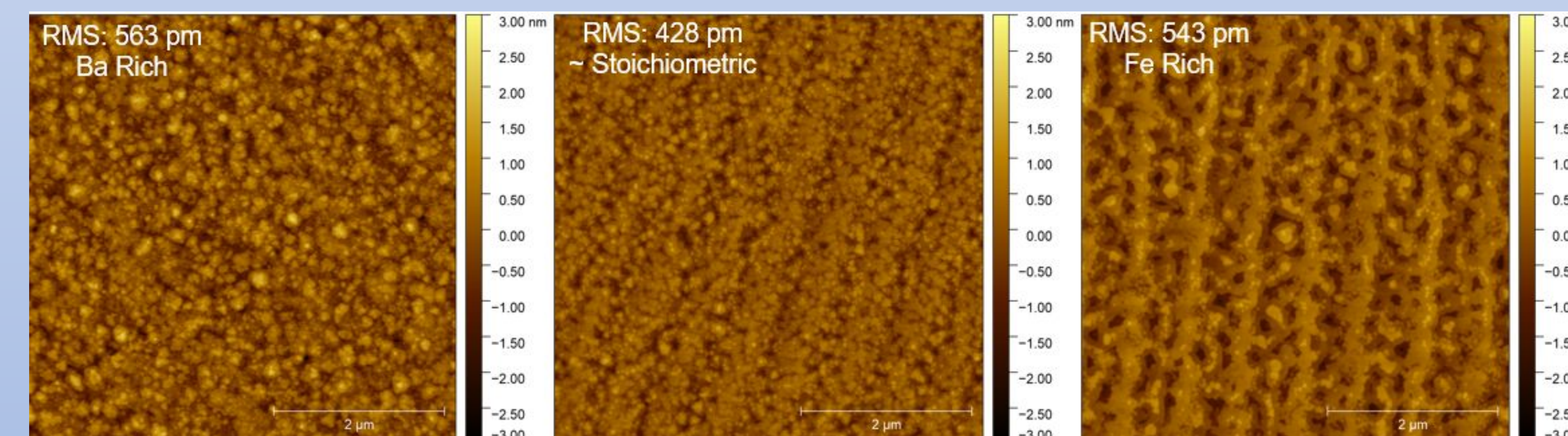


Using flux-controlled growth, BaM was grown on Al_2O_3 substrates to calibrate optimal growth conditions. Then BaM was grown on SGMZ substrates to apply an epitaxial strain to potentially have a multiferroic material.

III. Results



ω Scans, 2θ Scans, and AFM Imaging was done on BaM film grown on Sapphire (Al_2O_3) substrates. Adjusting Iron flux according to each samples growth calibration to achieve flux stoichiometry. Having an optimal flux ratio allows for optimal crystal quality and smoothness.



Reciprocal Space Mapping, ω Scans, and RHEED done on BaM film grown on SGMZ substrates. The in-plane lattice parameters of BaM and SGMZ are the same therefore a strain has been applied.

AFM Imaging data collected on BaM film grown on SGMZ substrates.

IV. Conclusion

Future work includes further research on whether an epitaxial strain can be applied to BaM on SGMZ substrates.

V. Acknowledgements

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VI. References

- [1] Shepherd, P., Mallick, K. K., Green, R. J. Magnetic and structural properties of M-type barium hexaferrite prepared by co-precipitation. *Magn. Mater.* 311, 2 (2007) 691.
- [2] Rowley, S., Chai, Y. S., Shen, S. P. *et al.* Uniaxial ferroelectric quantum criticality in multiferroic hexaferrites $\text{BaFe}_{12}\text{O}_{19}$ and $\text{SrFe}_{12}\text{O}_{19}$. *Sci Rep* 6, 25724 (2016) 2.
- [3] Made by PI: Schlom, D. G., Professor, Cornell University (2022)
- [4] Made by Mentor: Li, Y. E., PhD Candidate, Cornell University (2021).