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Identification of Magnetic Remanence Carrier Inclusions within a Single Feldspar Crystals

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Introduction

Minute magnetic inclusions as small as 50–350 nm can be found in individual plagioclase crystals; these inclusions have the potential to be high-fidelity magnetic field recorders (Cottrell and Tarduno, 1999, 2000). Thus, feldspars are less prone to experimental alteration than bulk samples (Tarduno et al. 2006). This encourages researchers to look for natural paleomagnetic recorders that are less prone to alterations in both nature and the lab.

Methods

Light microscopy
Secondary electron
Backscattered electron
Energy dispersive Spectroscopy

Samples

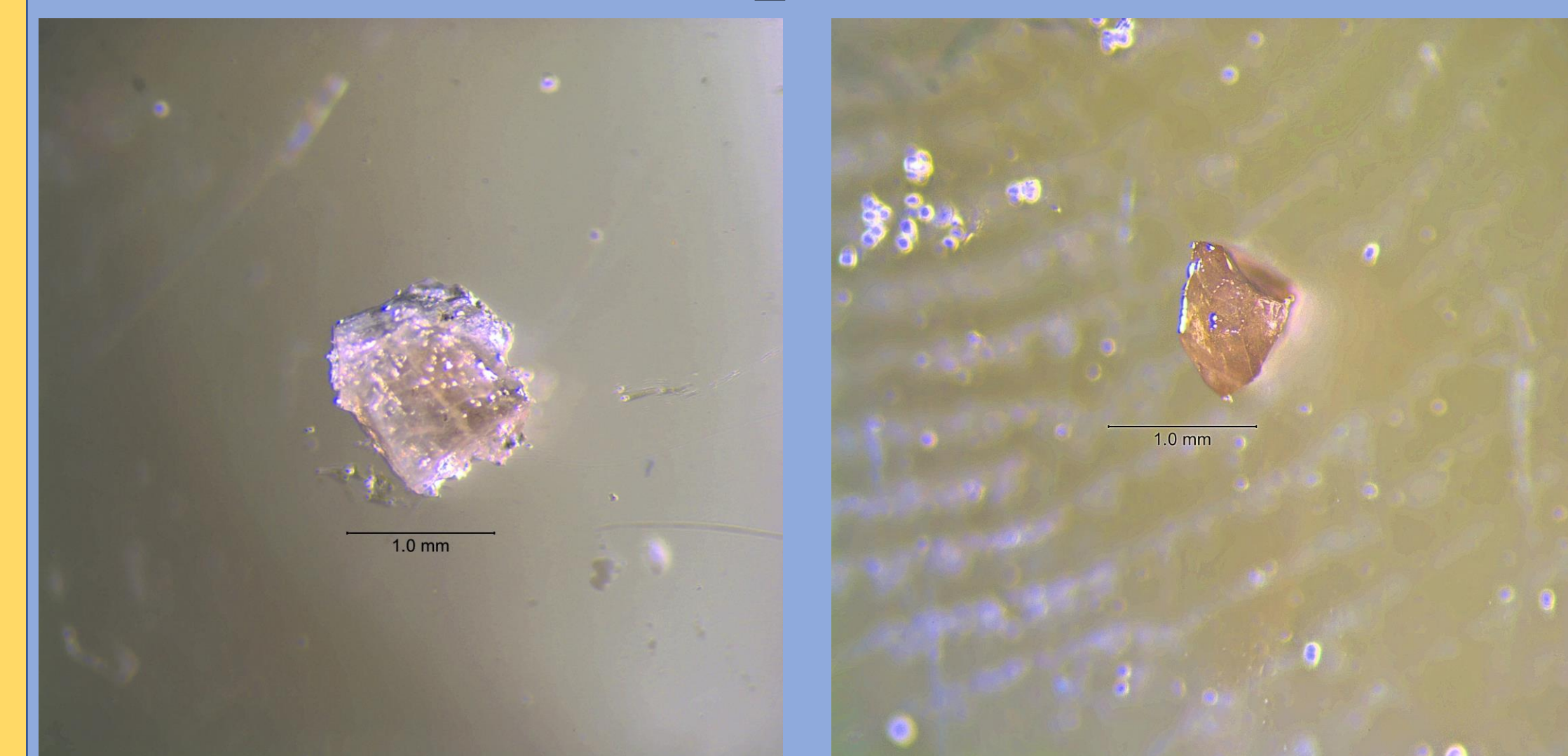


Fig. 1 Feldspar crystals under light microscopy

Acknowledgment

I would like to thank Dr. Sean, Dr. Gregg and Mr. Ethan. Besides, I would like to thank my research group for providing me samples

Results

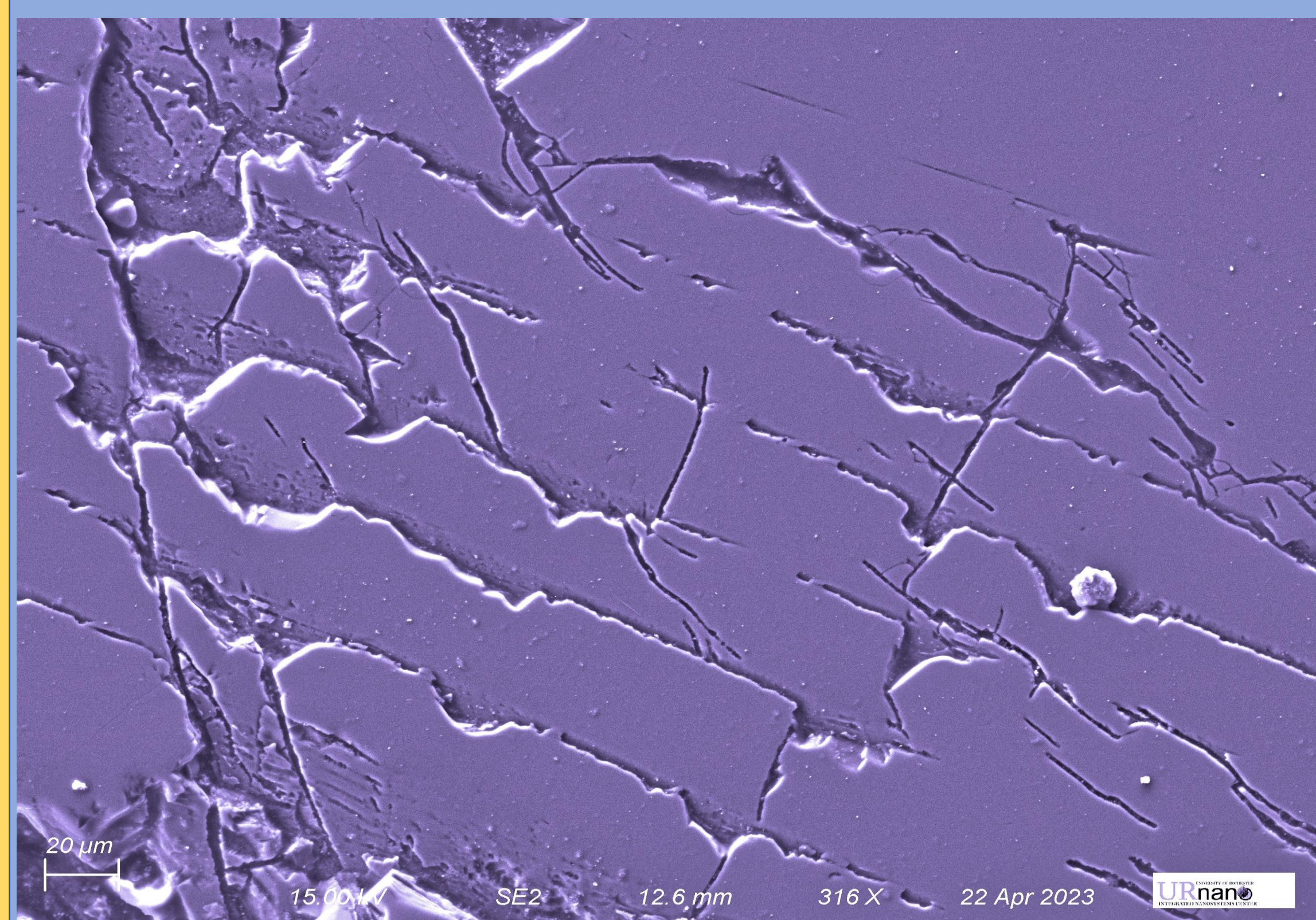
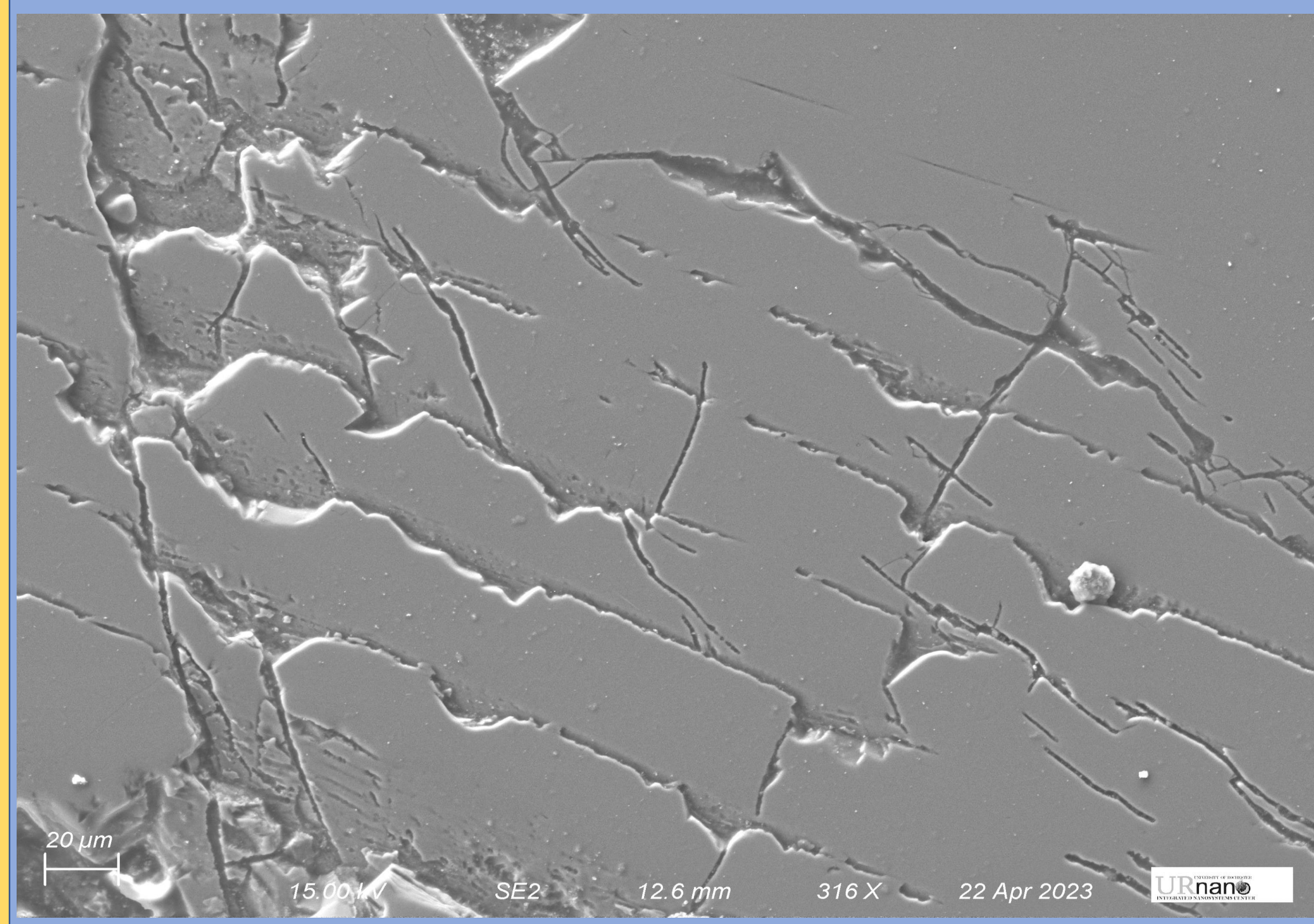


Fig.2 Normal and colored SE2 image of surface of feldspar crystal

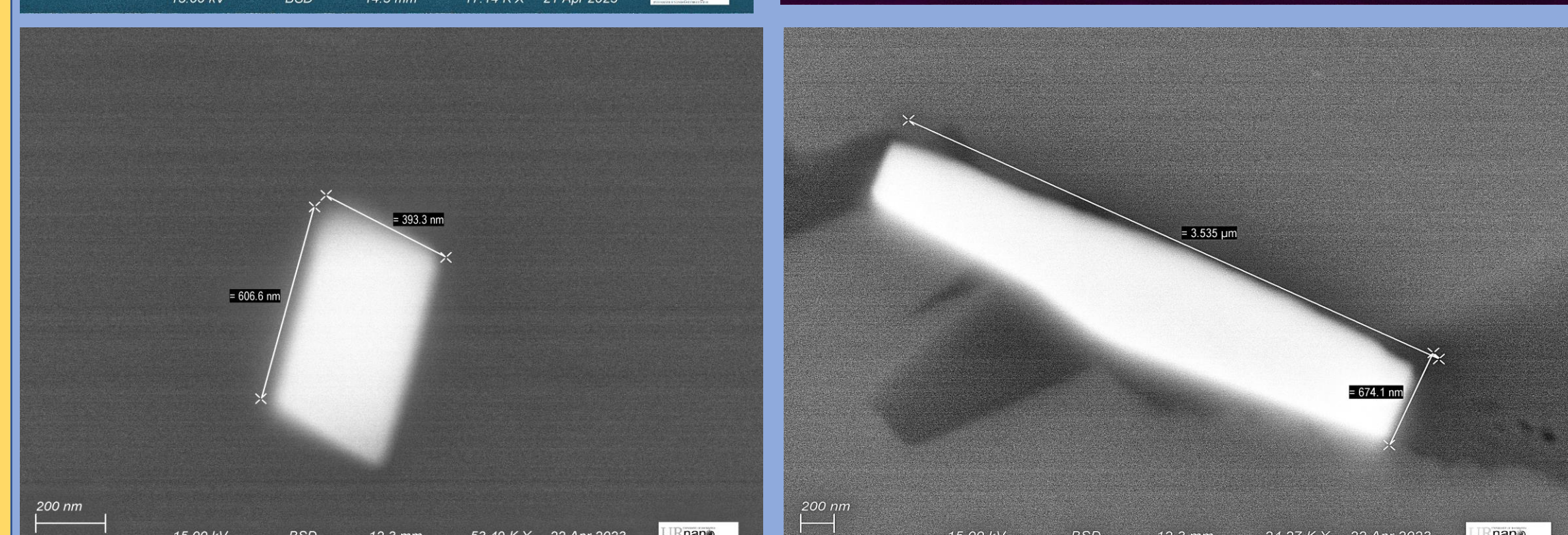
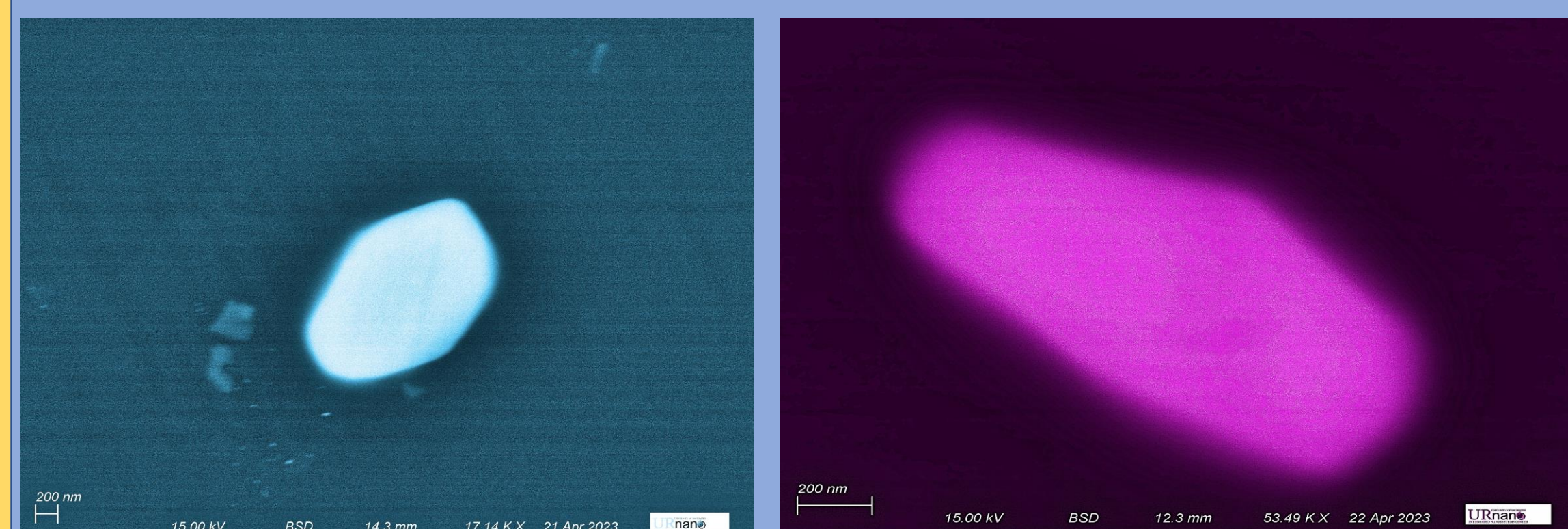


Fig. 3 Colored and normal BSD image of minute Magnetite grains having clear crystal faces

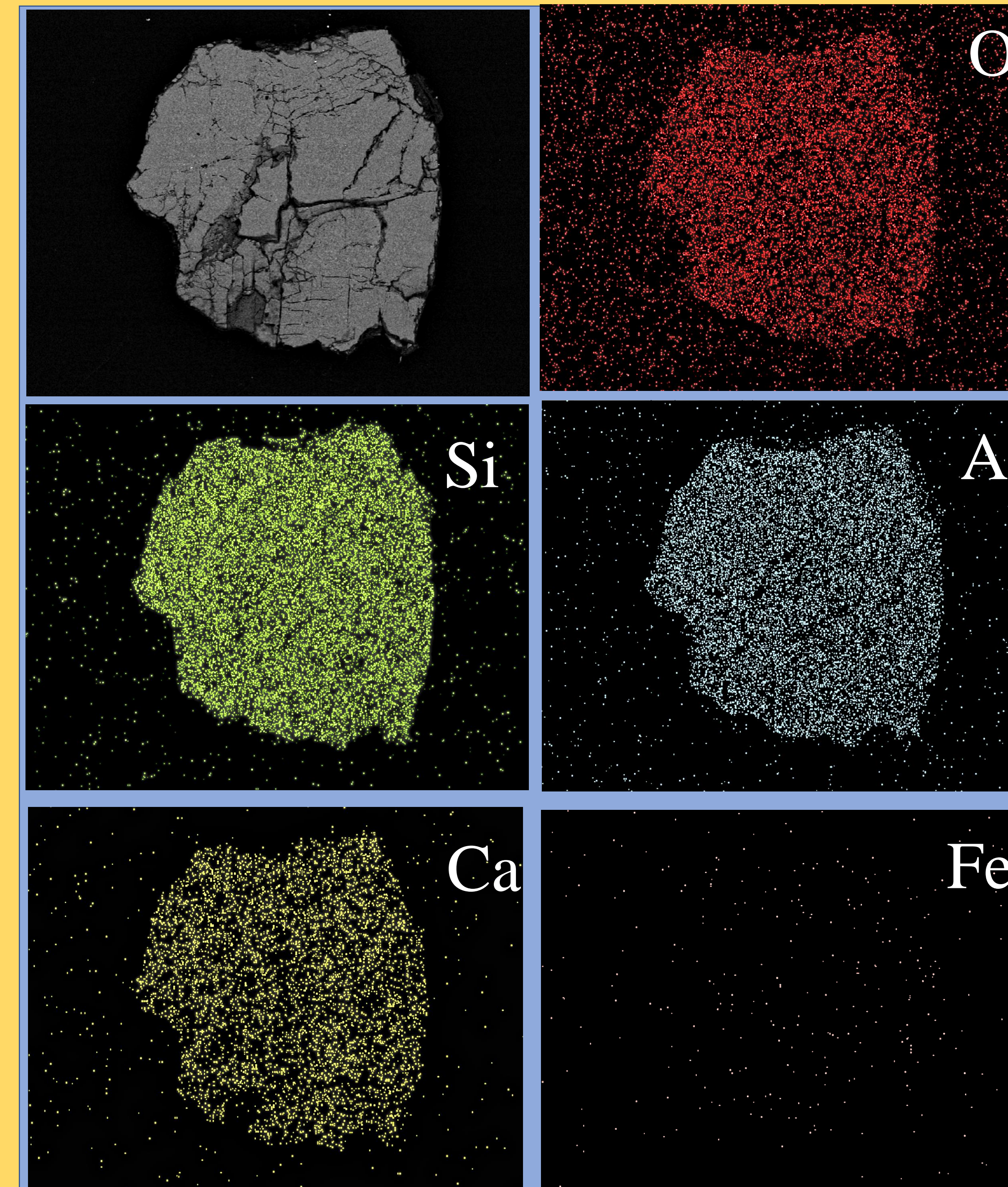


Fig. 4 EDS elemental distribution mapping within a single feldspar crystal

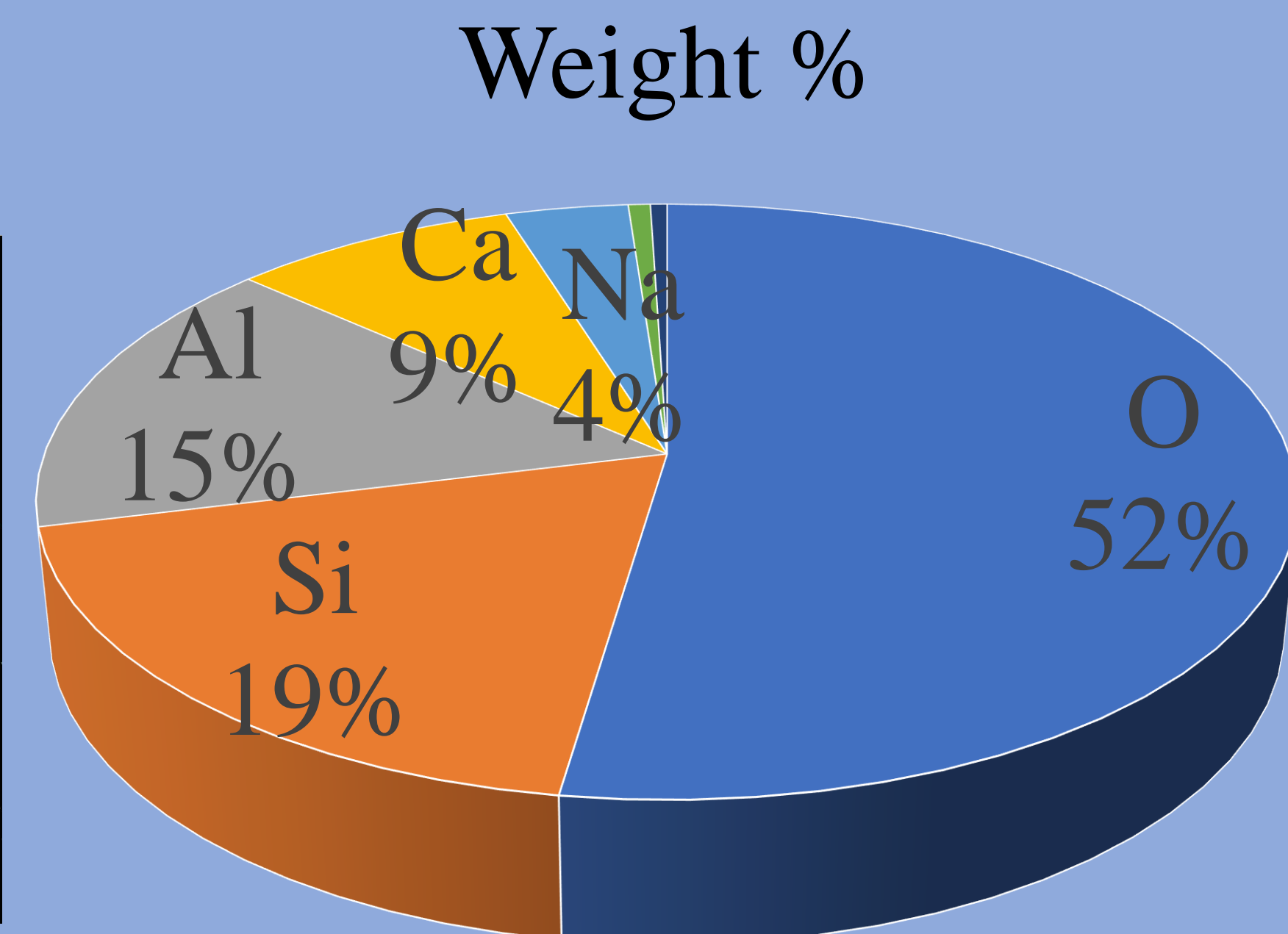


Fig. 6 Weight percentage of elements within the feldspar mineral

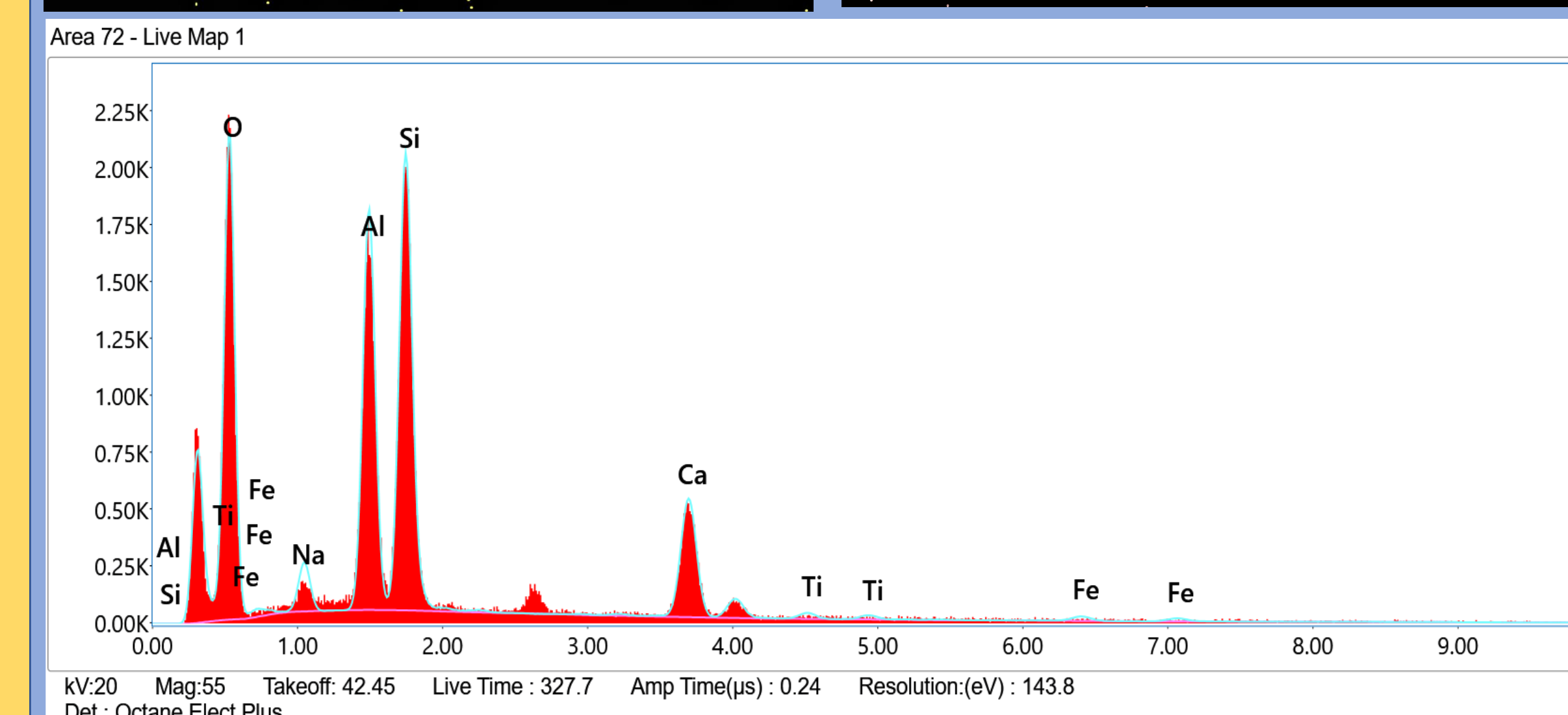


Fig. 5 EDS elemental distribution spectrum within a single feldspar crystal

Conclusion

The result of this project work confirms the presence of minute magnetite grains which are potential recorder of the ancient earth's magnetic field.

References

Cottrell, R. D., & Tarduno, J. A. (1999). Geomagnetic palaeointensity derived from single plagioclase crystals. *Earth and Planetary Science Letters*, 169(1-2), 1-5.
Cottrell, R. D., & Tarduno, J. A. (2000). In search of high-fidelity geomagnetic paleointensities: A comparison of single plagioclase crystal and whole rock Thellier-Thellier analyses. *Journal of Geophysical Research: Solid Earth*, 105(B10), 23579-23594.
Tarduno, J. A., Cottrell, R. D., & Smirnov, A. V. (2006). The paleomagnetism of single silicate crystals: Recording geomagnetic field strength during mixed polarity intervals, superchrons, and inner core growth. *Reviews of Geophysics*, 44(1).