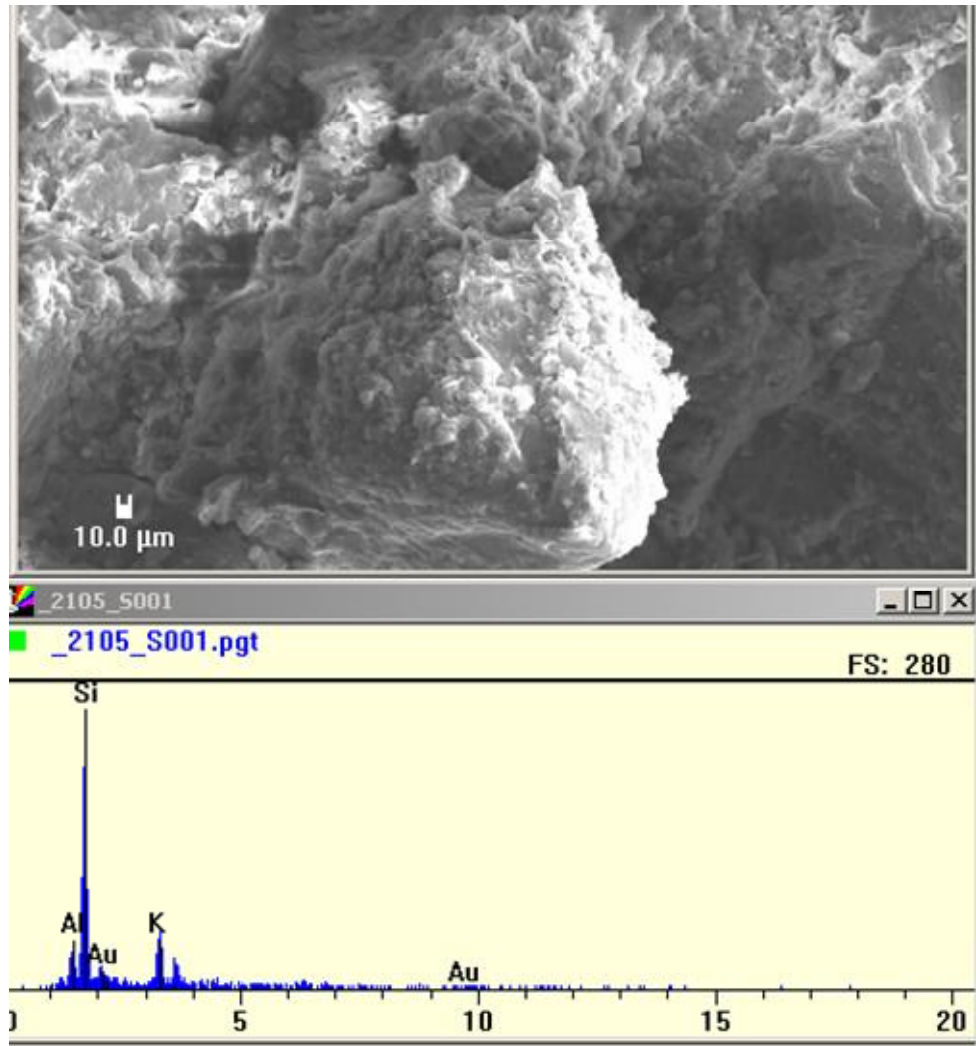
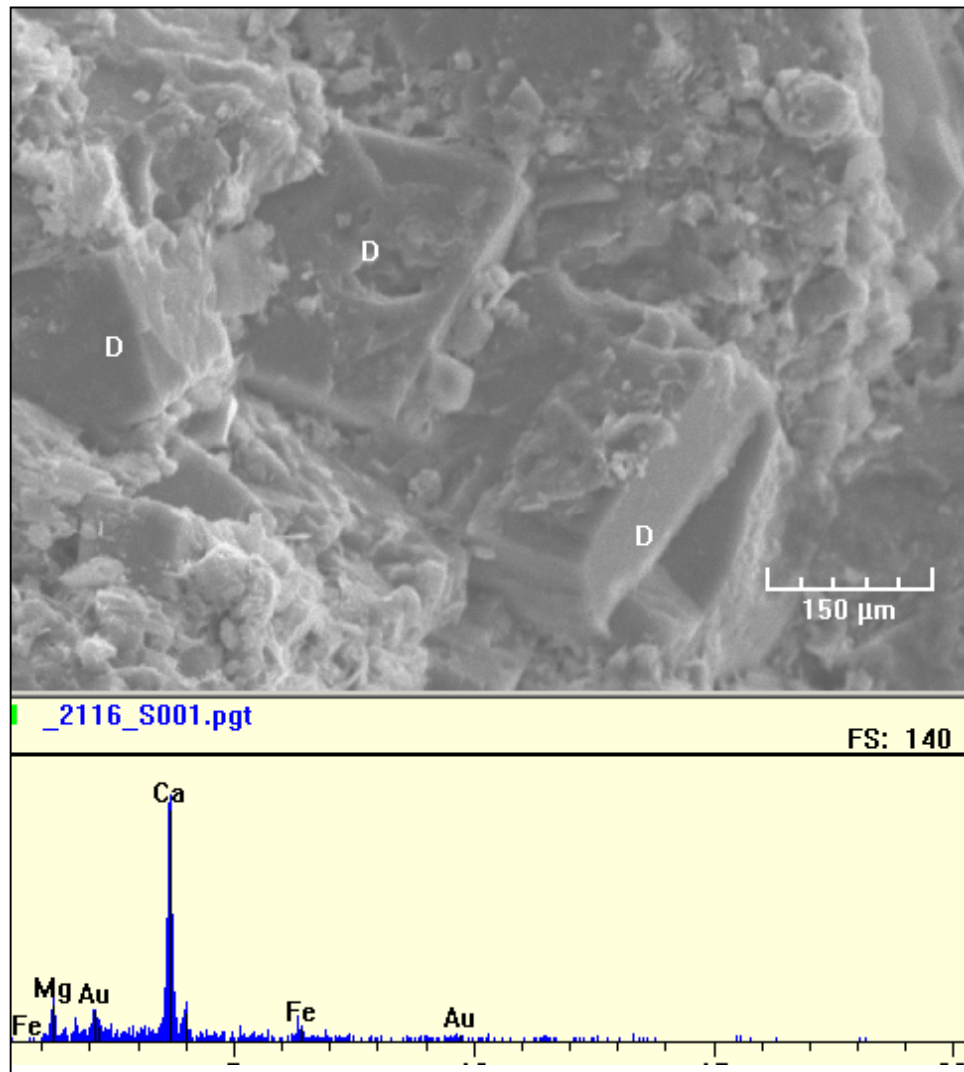


APPENDIX C: SEM-EDS FACIES PHOTOMICROGRAPHS



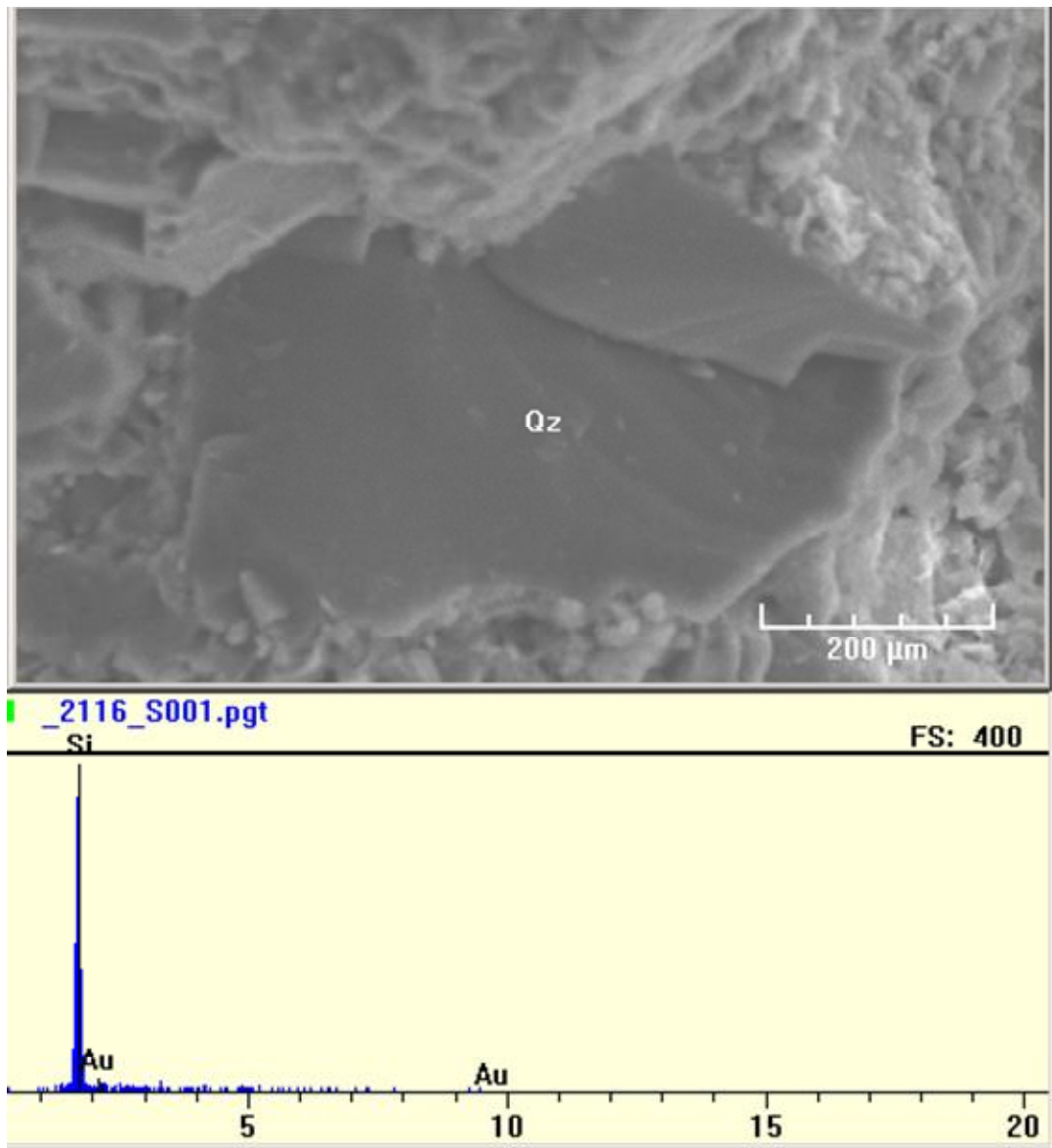
Appendix C.1. Facies D. Sample 1. Authigenic potassium feldspar grain with potassium feldspar overgrowths. Equal heights of K and Al indicate potassium feldspar.

Scope magnification: 600X



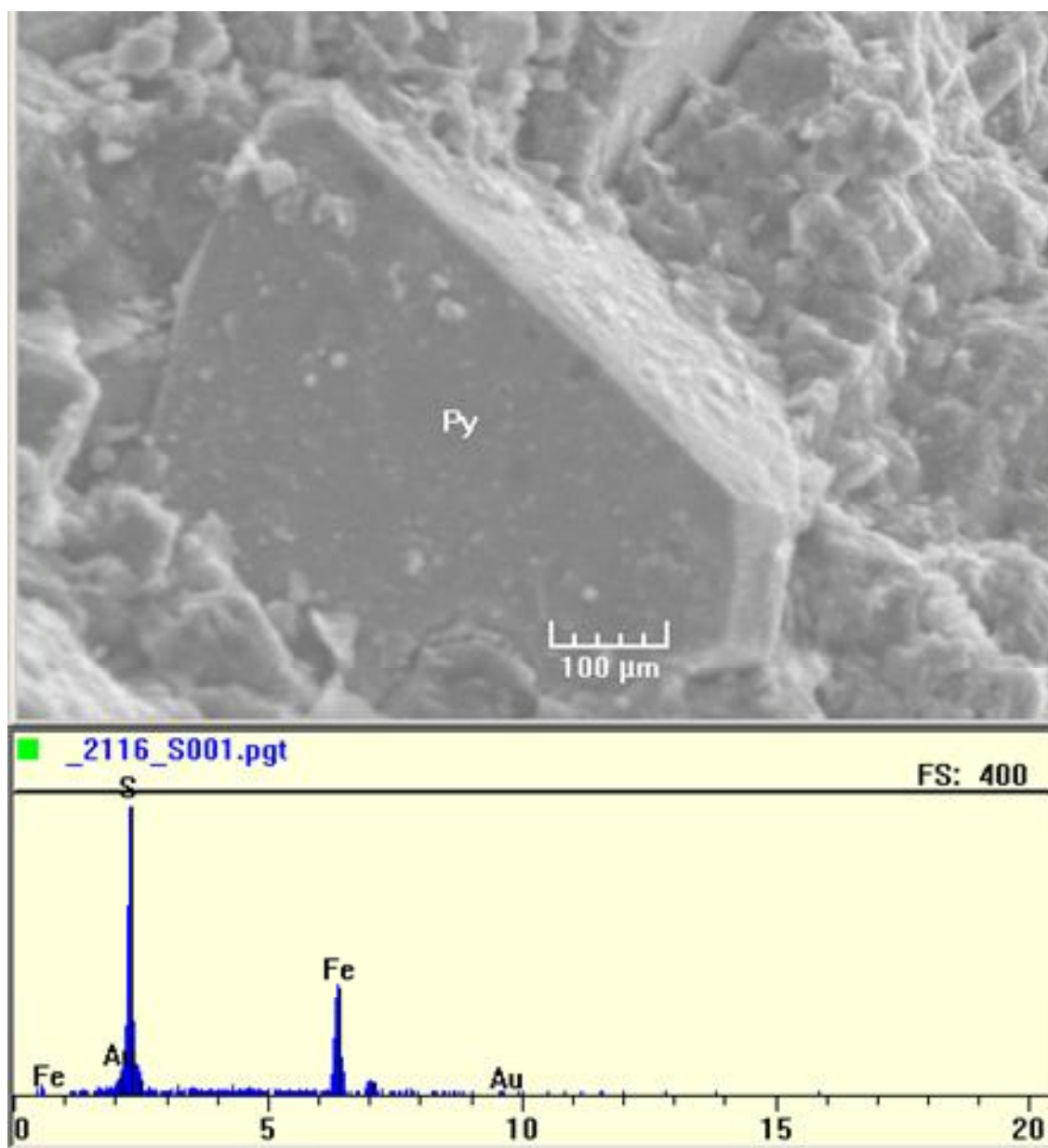
Appendix C.2. Facies D. Sample 1. Well-developed authigenic dolomite rhombs (D) in a fine-grain detrital potassium feldspar clay matrix.

Scope magnification: 1100X



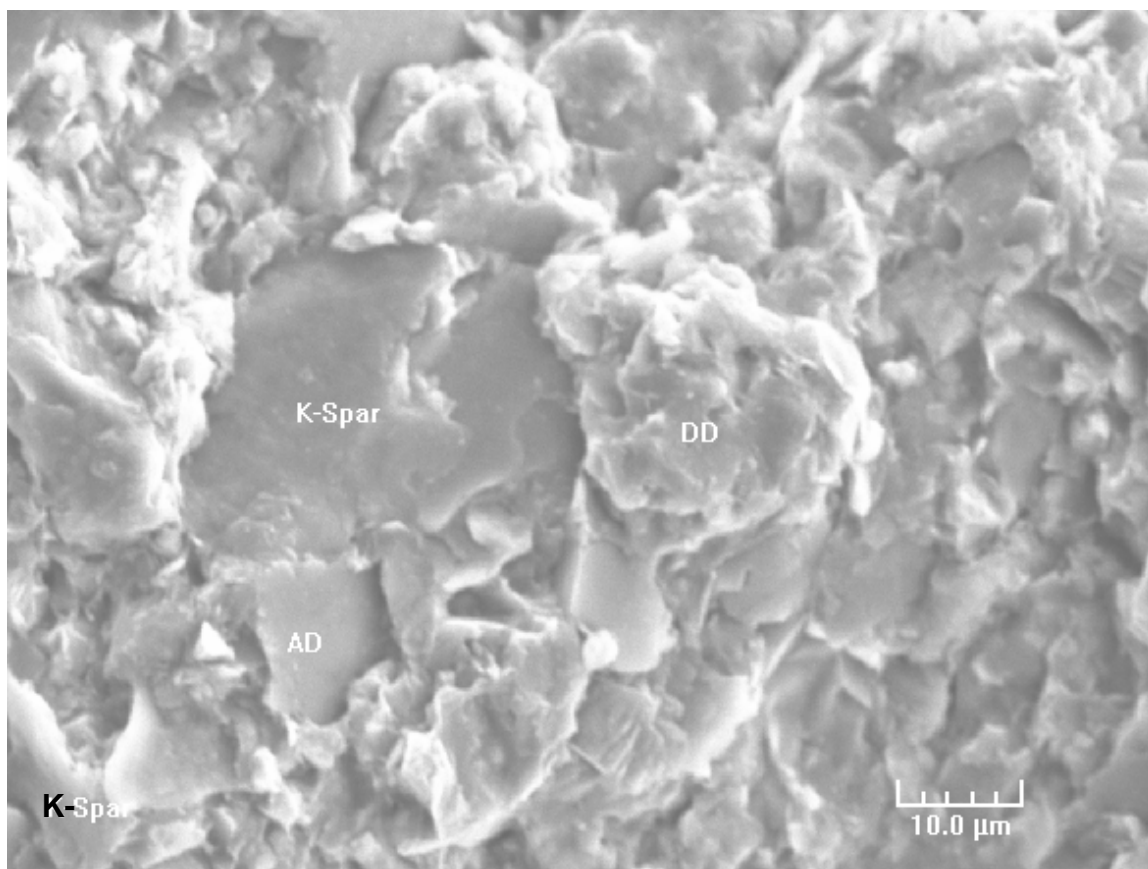
Appendix C.3: Facies D. Sample 1. Detrital quartz grain.

Scope magnification: 1100X



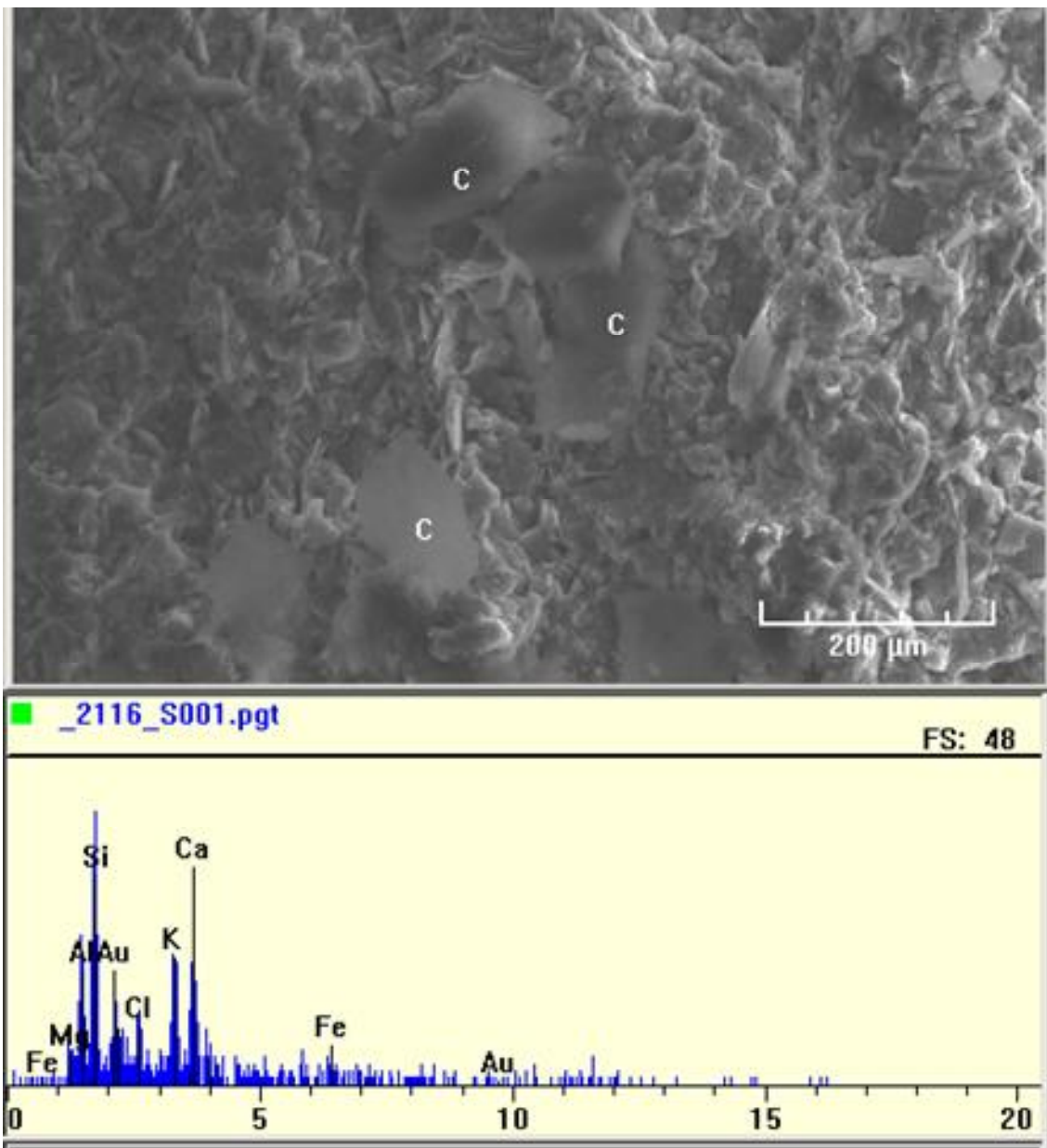
Appendix C.4. Facies D. Sample 1. Authigenic pyrite grain in potassium feldspar clay matrix.

Scope magnification: 1000X



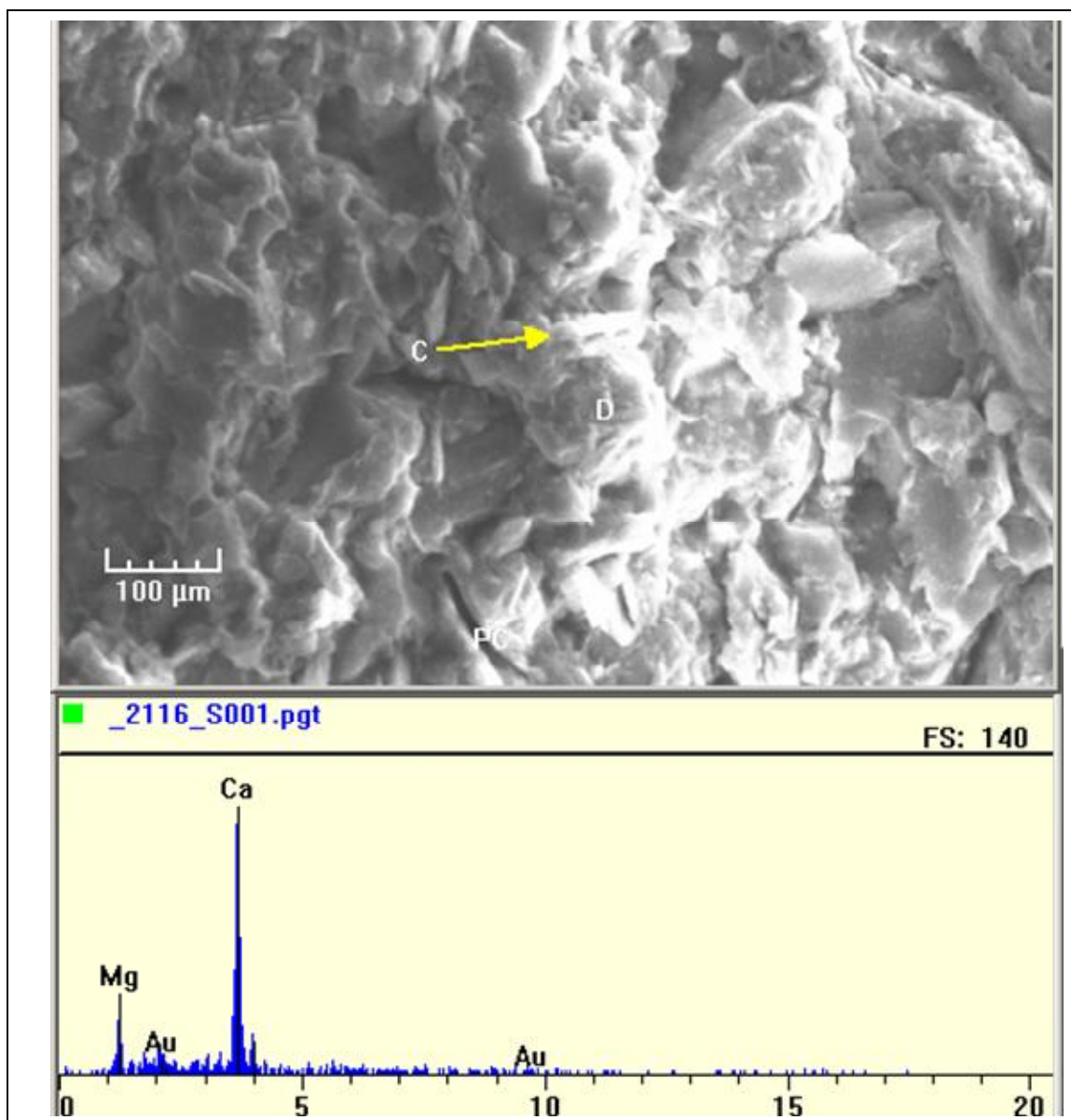
Appendix C.5. Facies B. Sample 2. Detrital k-spar clay matrix, authigenic dolomite (AD) and detrital dolomite (DD).

Scope magnification: 1200X

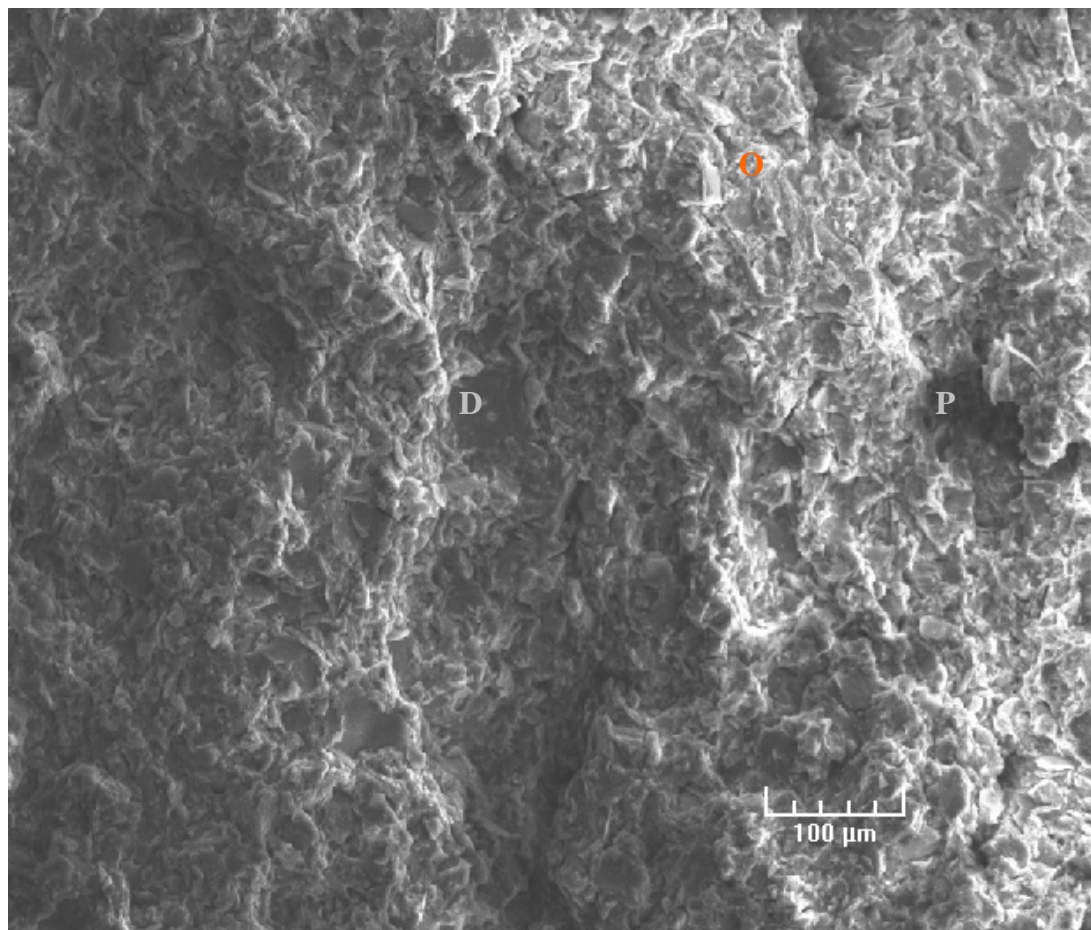


Appendix C.6. Facies B. Sample 2. Authigenic chlorite crystals (C). Potassium and aluminum are background noise from the surrounding K-Spar matrix.

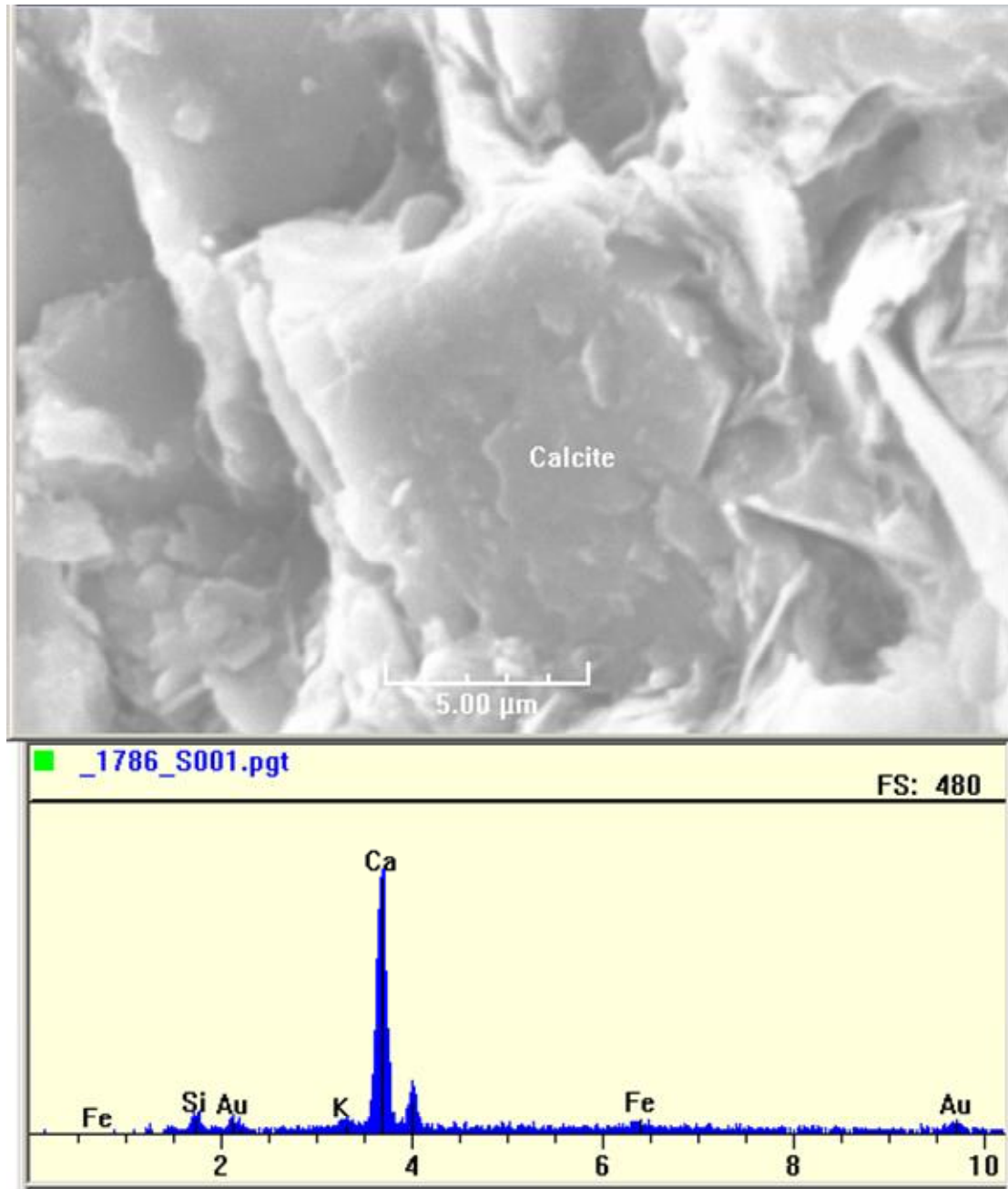
Scope magnification: 650X



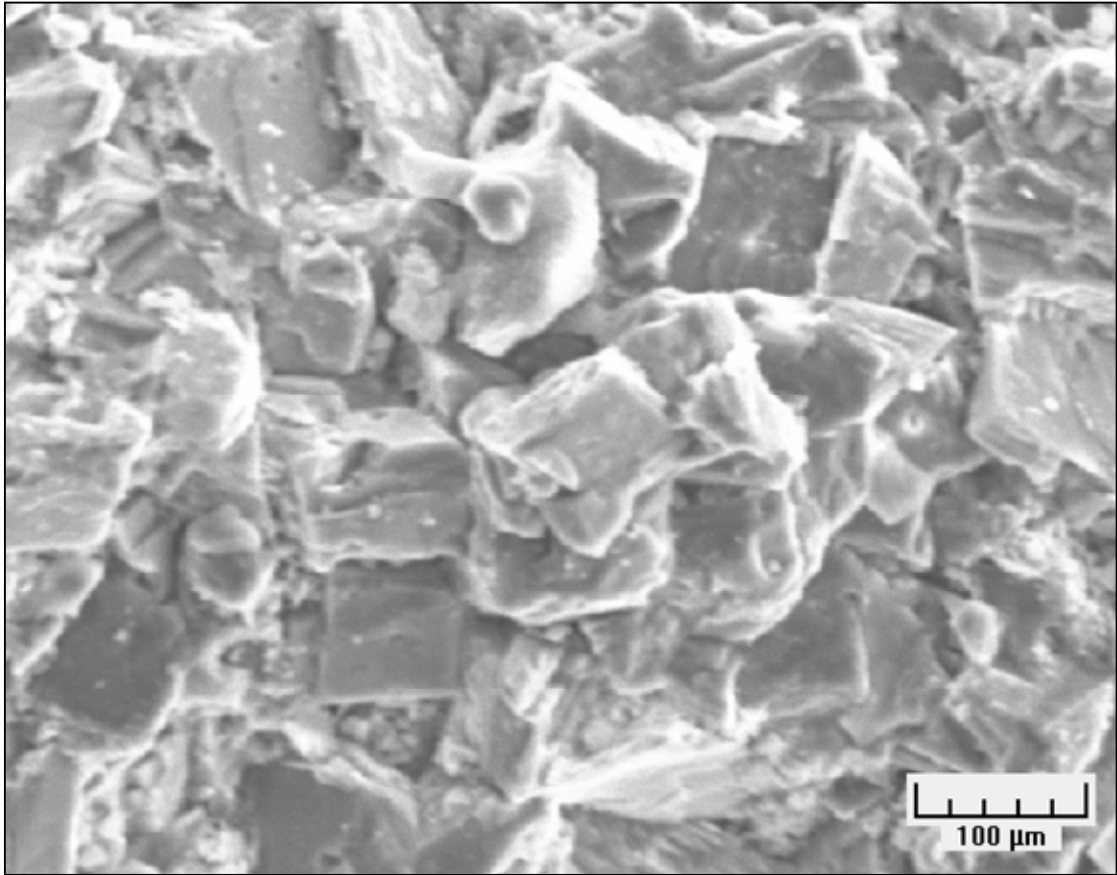
Appendix C.7. Facies B. Sample 2. Very fine-grained to siltstone size dolomite crystals (D) with clusters of elongate to disk-like, authigenic chlorite crystals (C). Plucked chlorite crystals also present (PC). K-spar clay matrix (K and AL peak are of equal height indicating K-spar).
Scope magnification: 1400X



Appendix C.8. Facies B. Sample 2. Chlorite grain coating (O) k-spar matrix with scattered dolomite crystals (D). P – Pore Space.

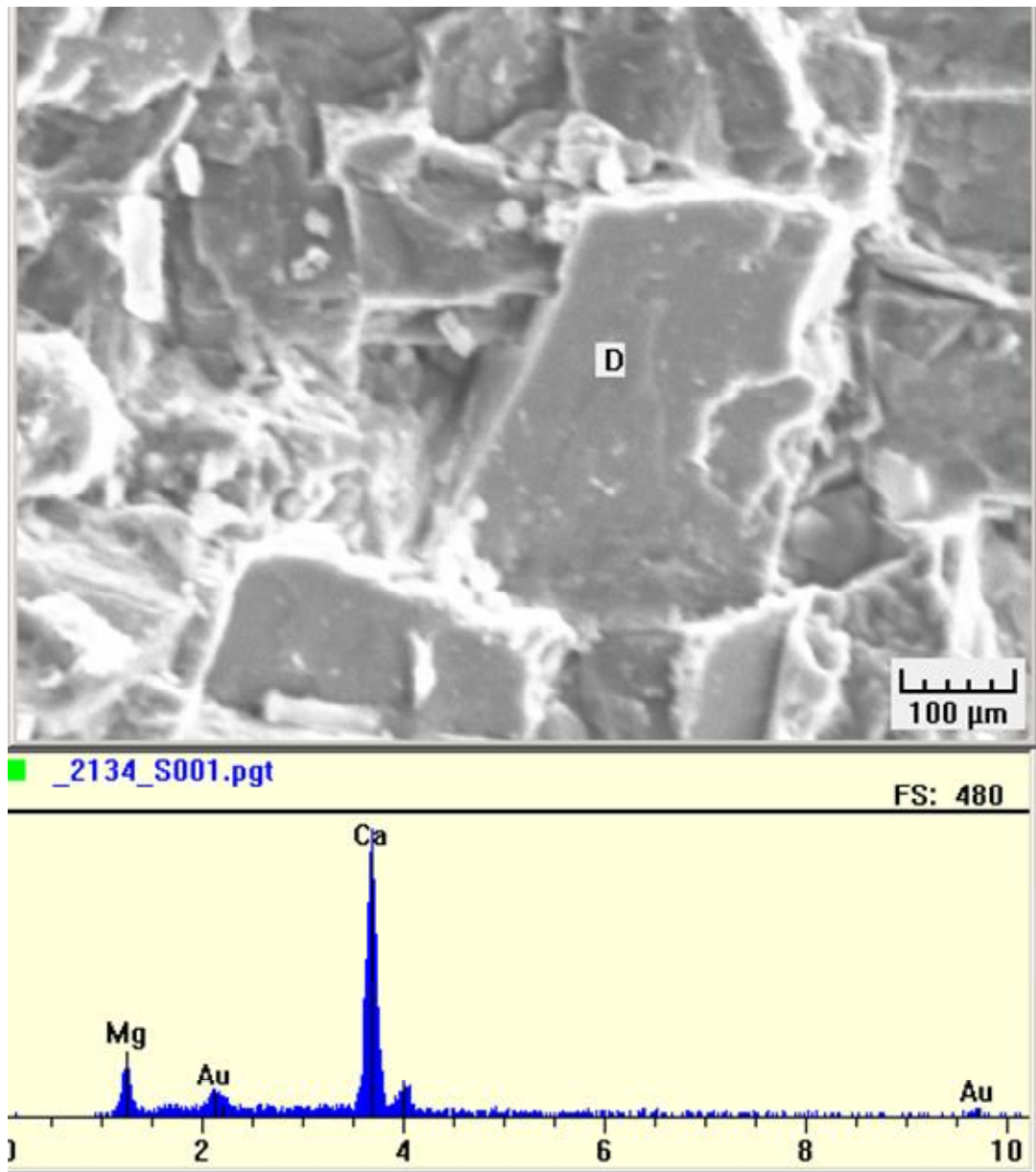


Appendix C.9. Facies B. Sample 2. Calcite grain.
Scope magnification: 4500X



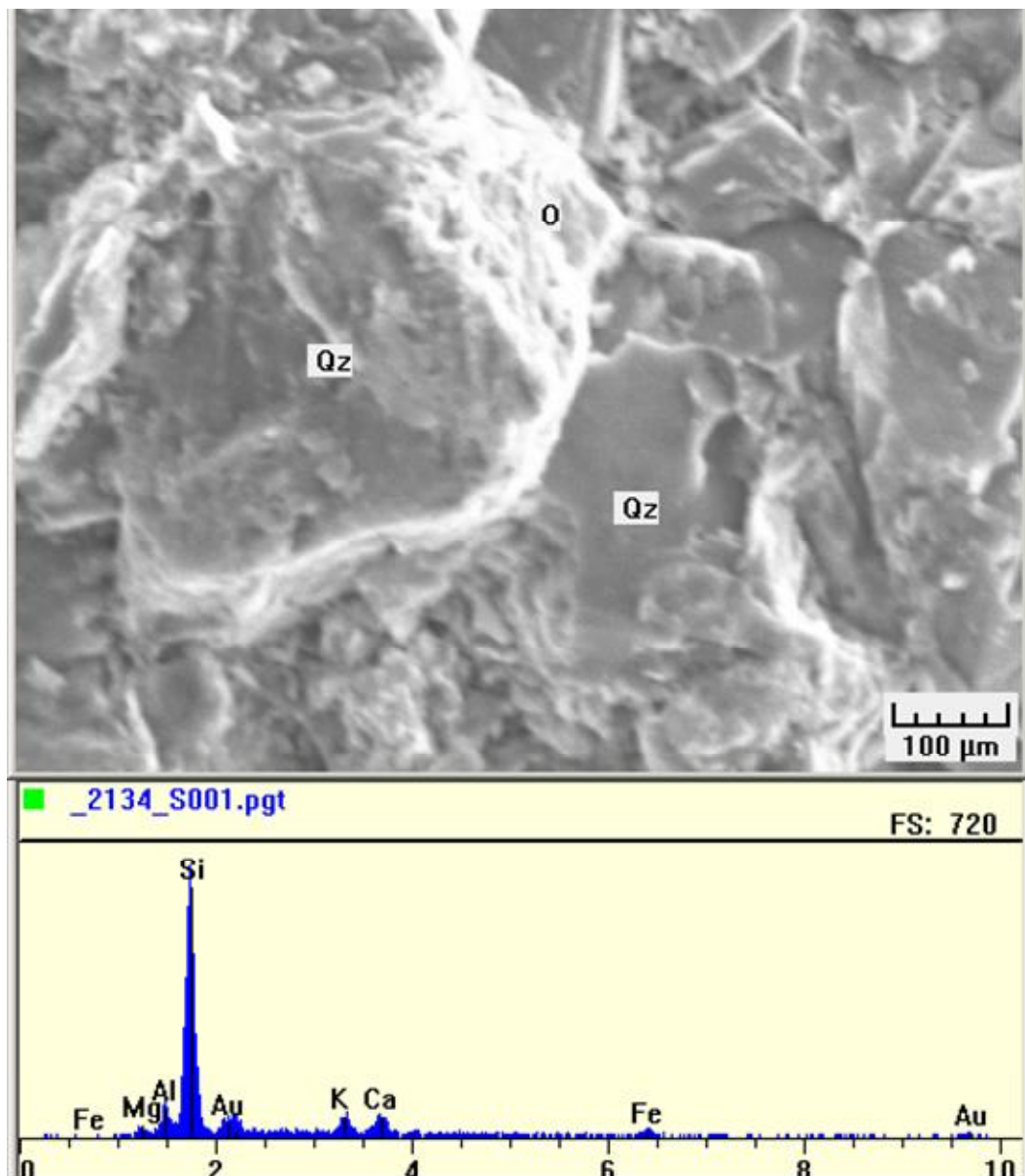
Appendix C.10. Facies C. Sample 2. Very fine-grained to siltstone sized authigenic dolomite rhombs.

Scope magnification: 550X



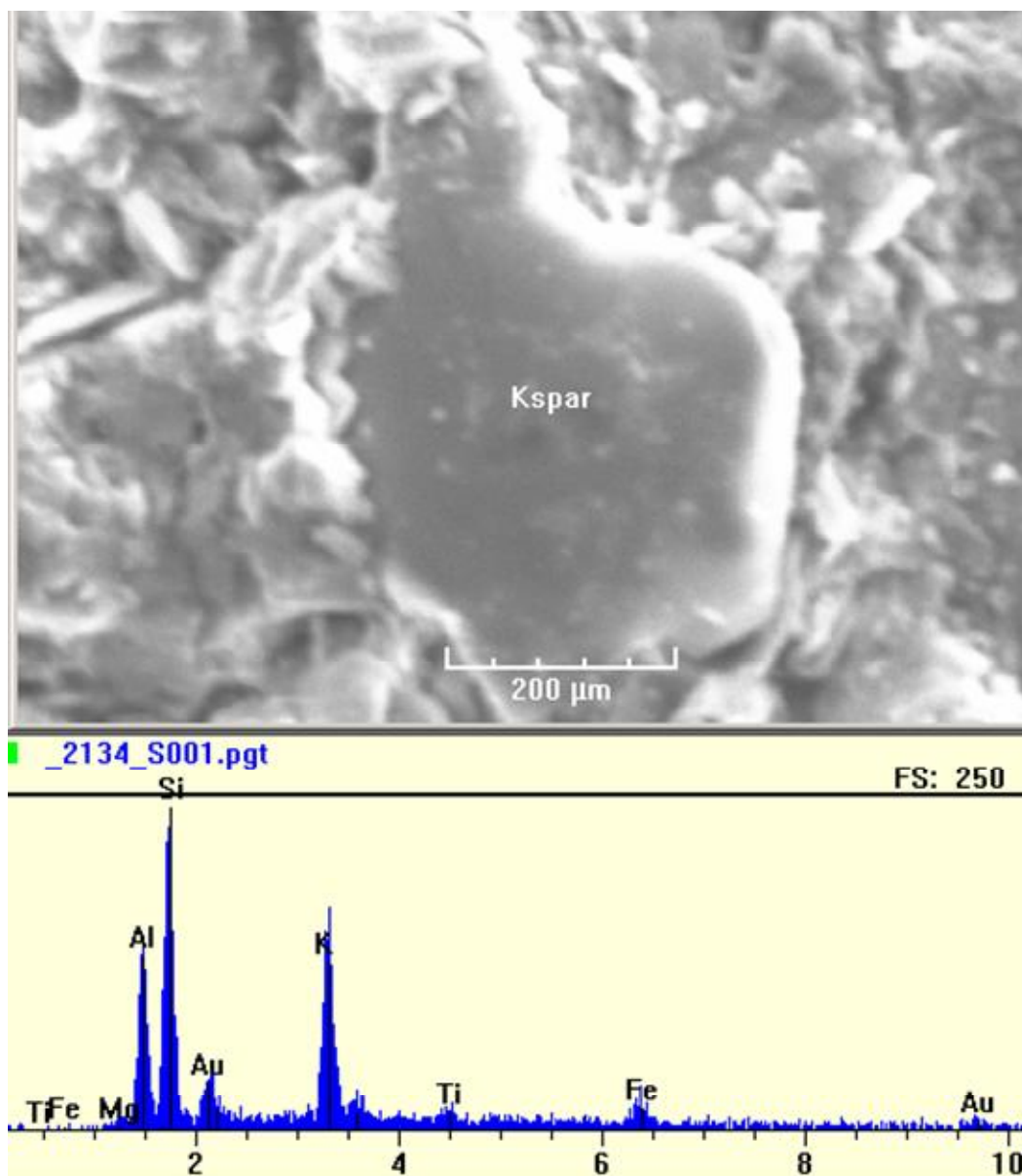
Appendix C.11. Facies C. Sample 3. Well developed authigenic dolomite rhombs (D) in fine-grained matrix.

Scope magnification: 950X



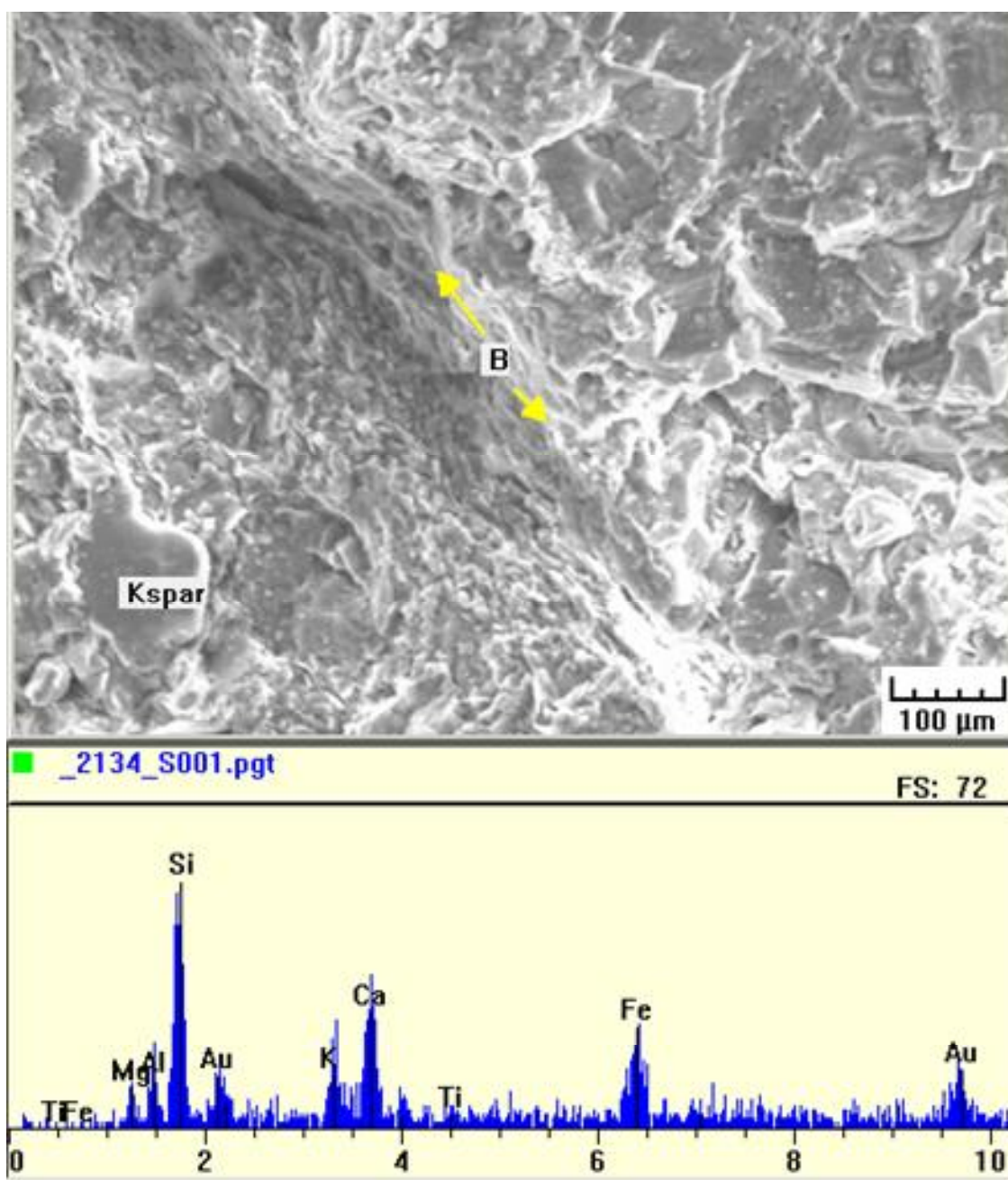
Appendix C.12. Facies C. Sample 3. Detrital quartz grains (Qz) with potassium feldspar overgrowths (O).

Scope magnification: 1000X



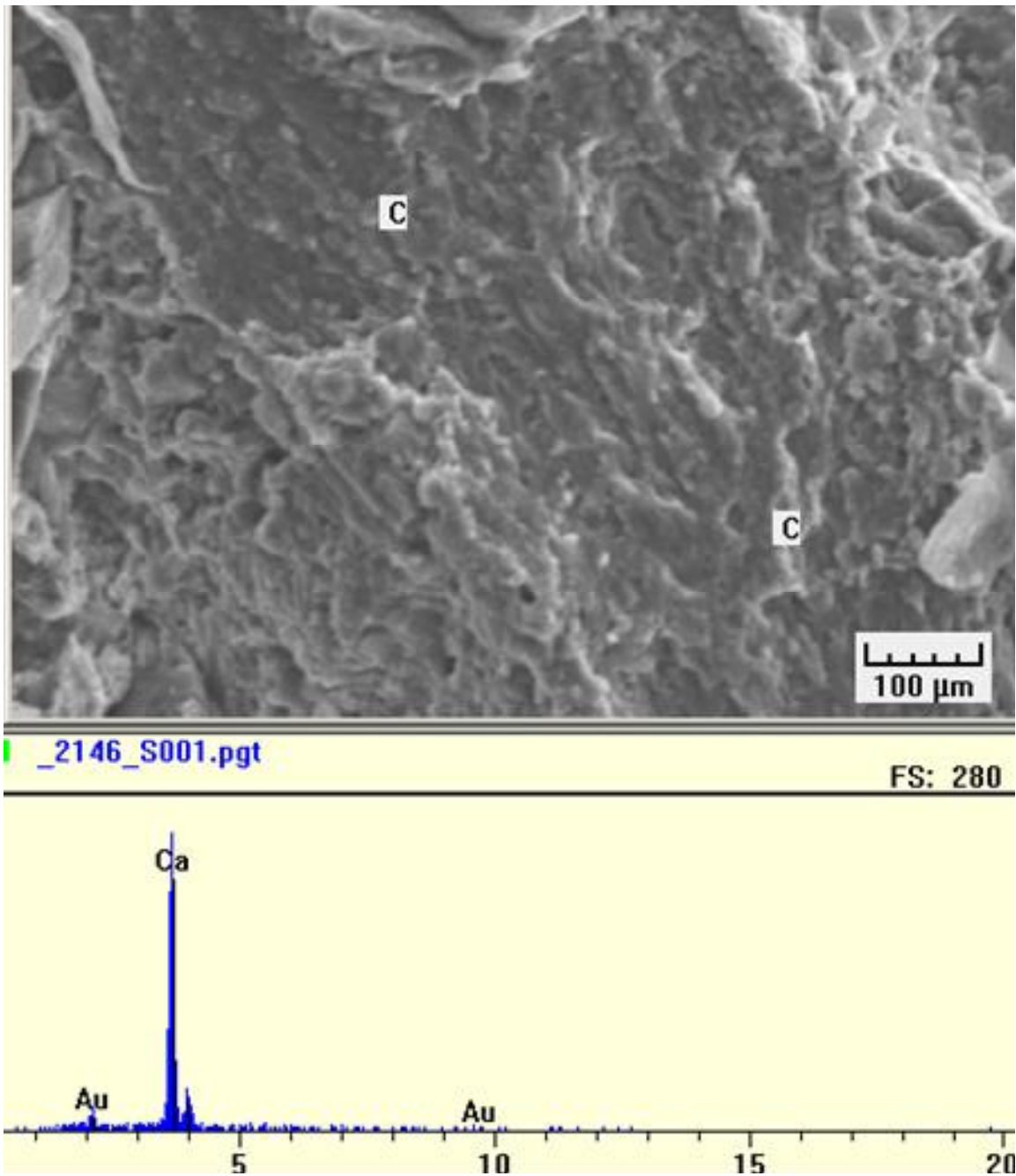
Appendix C.13. Facies C. Sample 3. Detrital authigenic potassium feldspar grain.

Scope magnification: 1500X



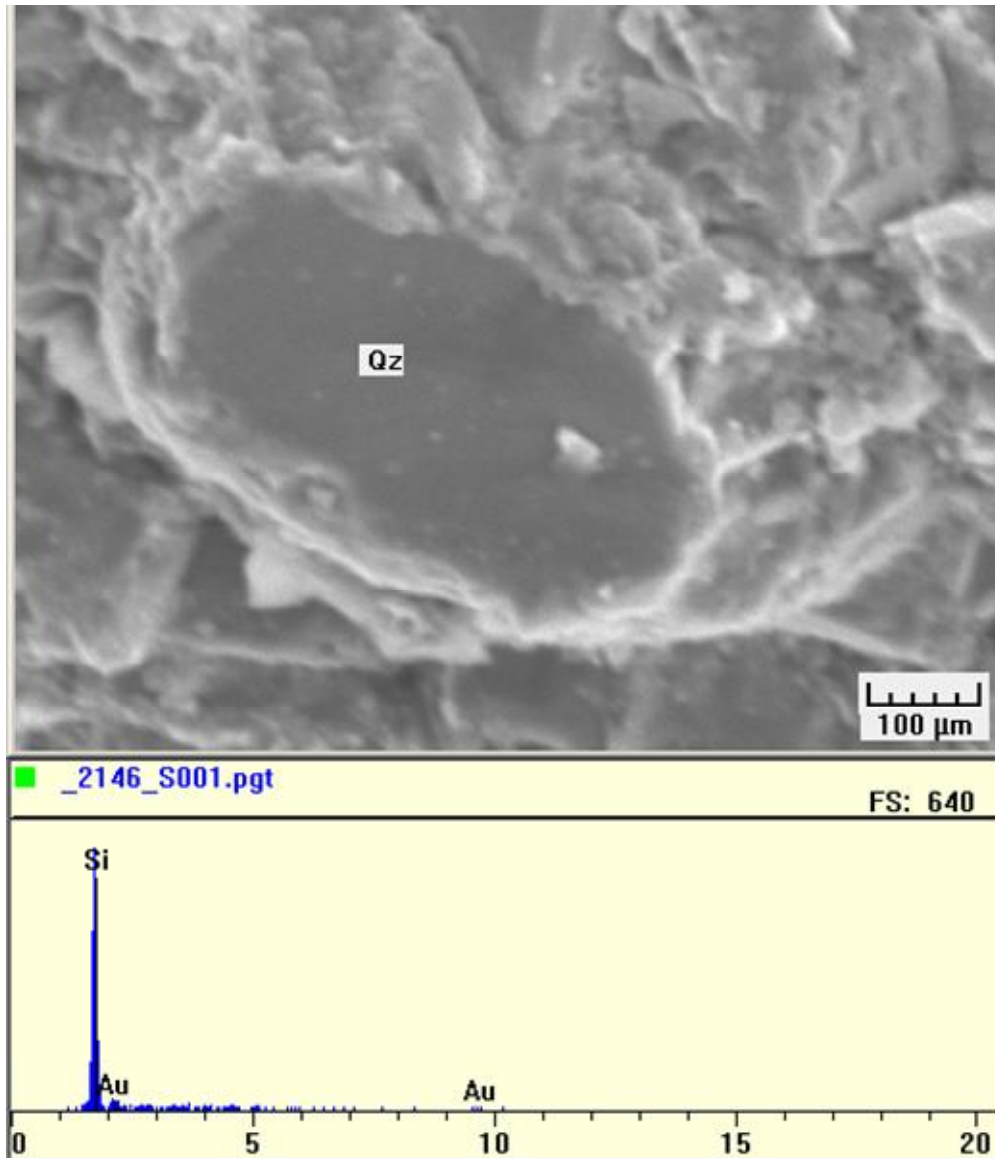
Appendix C.14. Facies C. Sample 3. Detrital biotite grain within the clay matrix.

Scope magnification: 700X

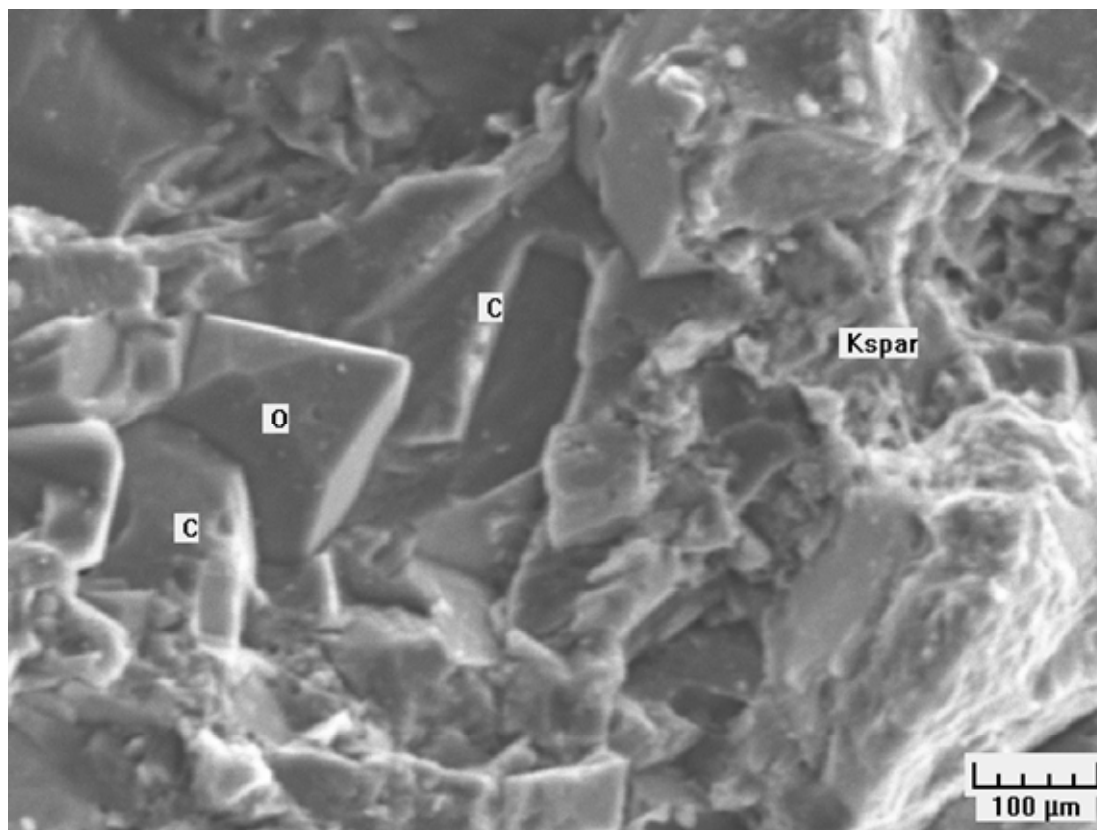


Appendix C.15. Facies D. Sample 4. Calcite grain

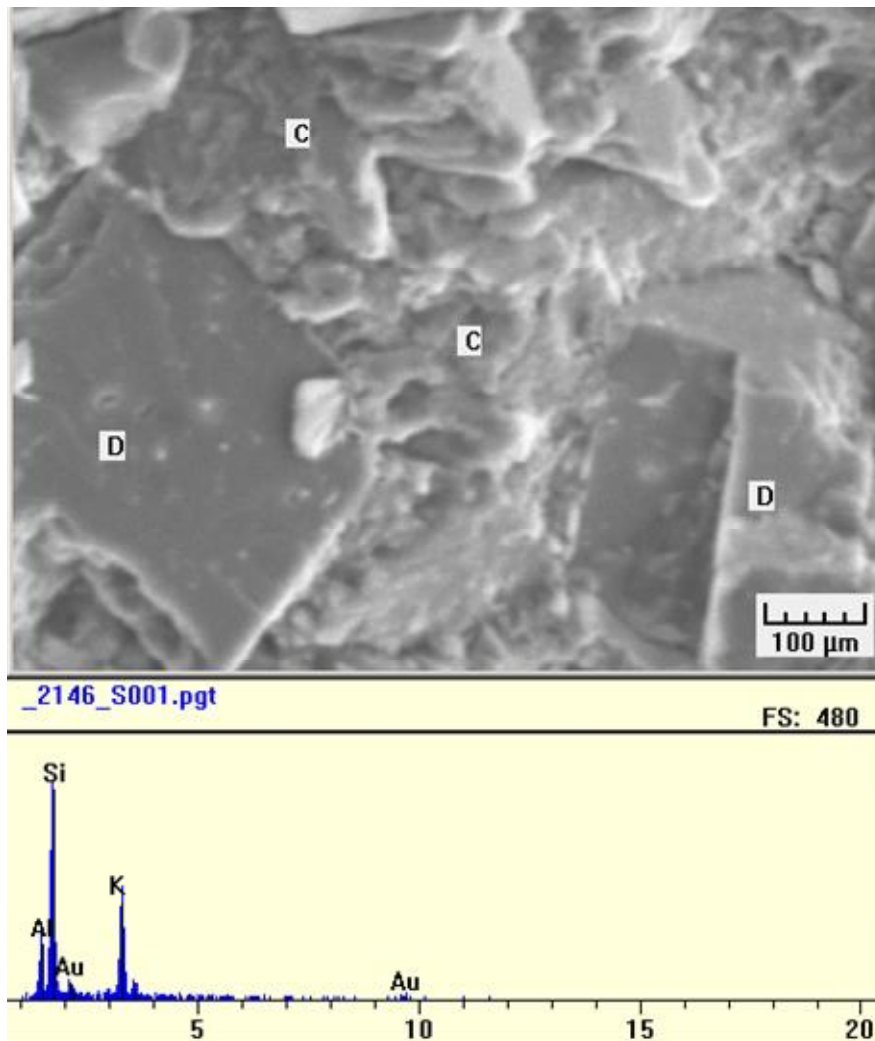
Scope magnification: 700X



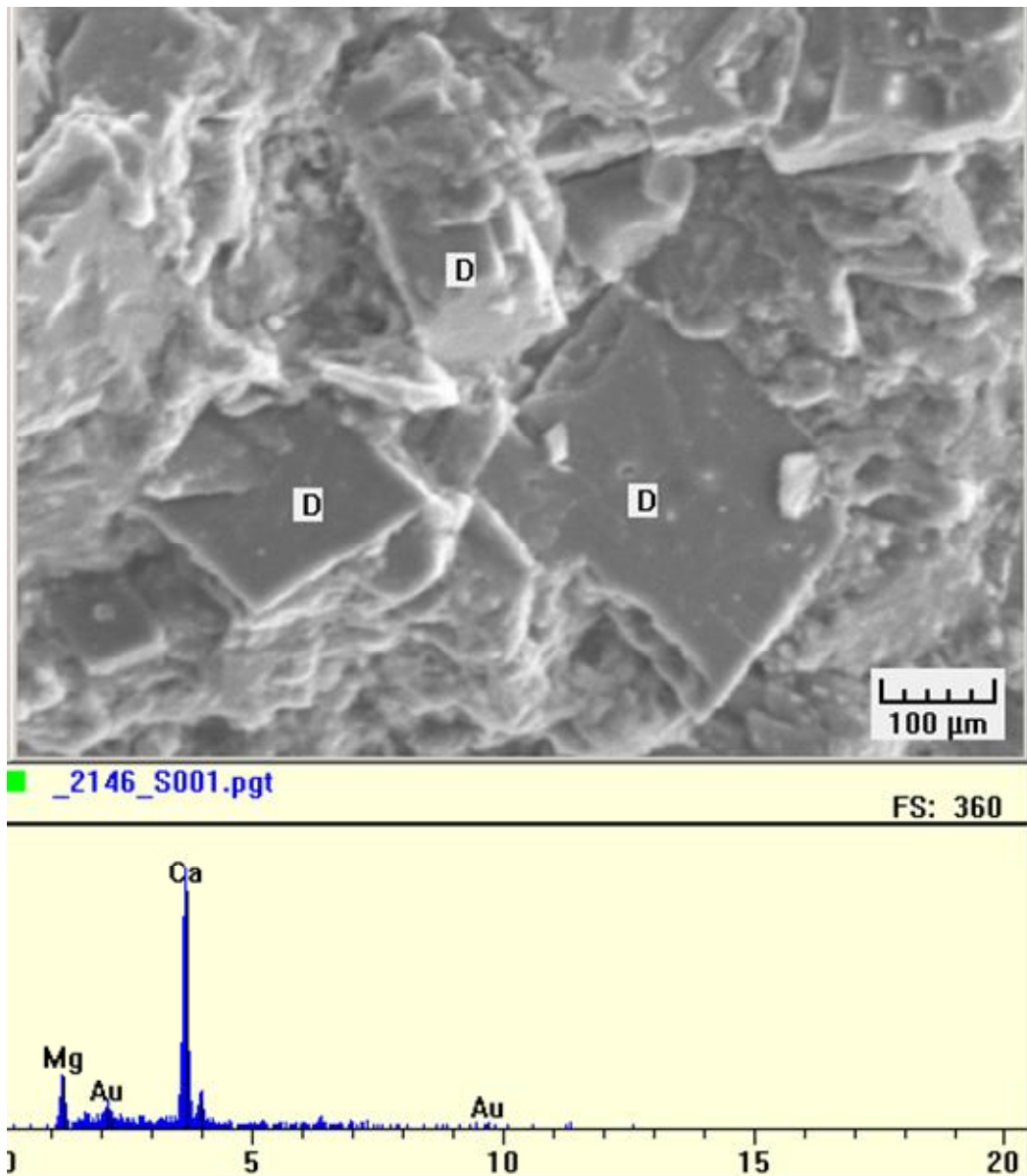
Appendix C.16. Facies D. Sample 4. Detrital quartz grain within a potassium feldspar clay matrix.
Scope magnification: 1300X



Appendix C.17. Facies D. Sample 4. Calcite (C), authigenic quartz overgrowth (O), clay size k-spar matrix.
Scope magnification: 800X

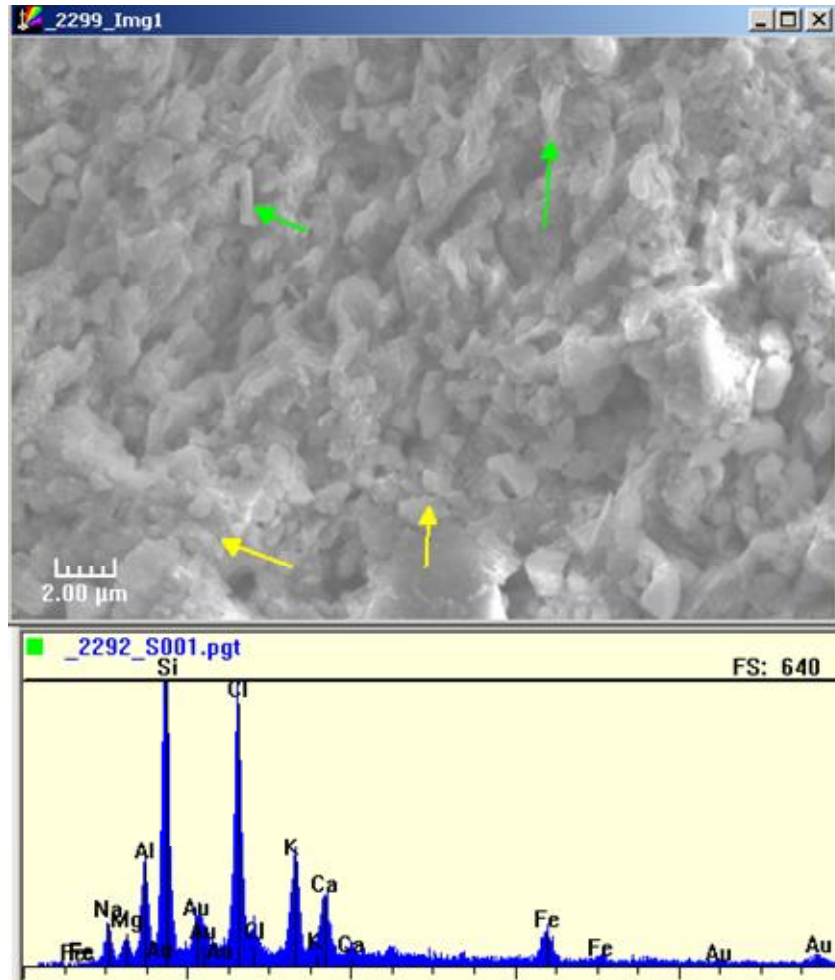


Appendix C.18. Facies D. Sample 4. Detrital potassium feldspar clay matrix (C). Well developed authigenic dolomite rhombs (D).
Scope magnification: 1200X



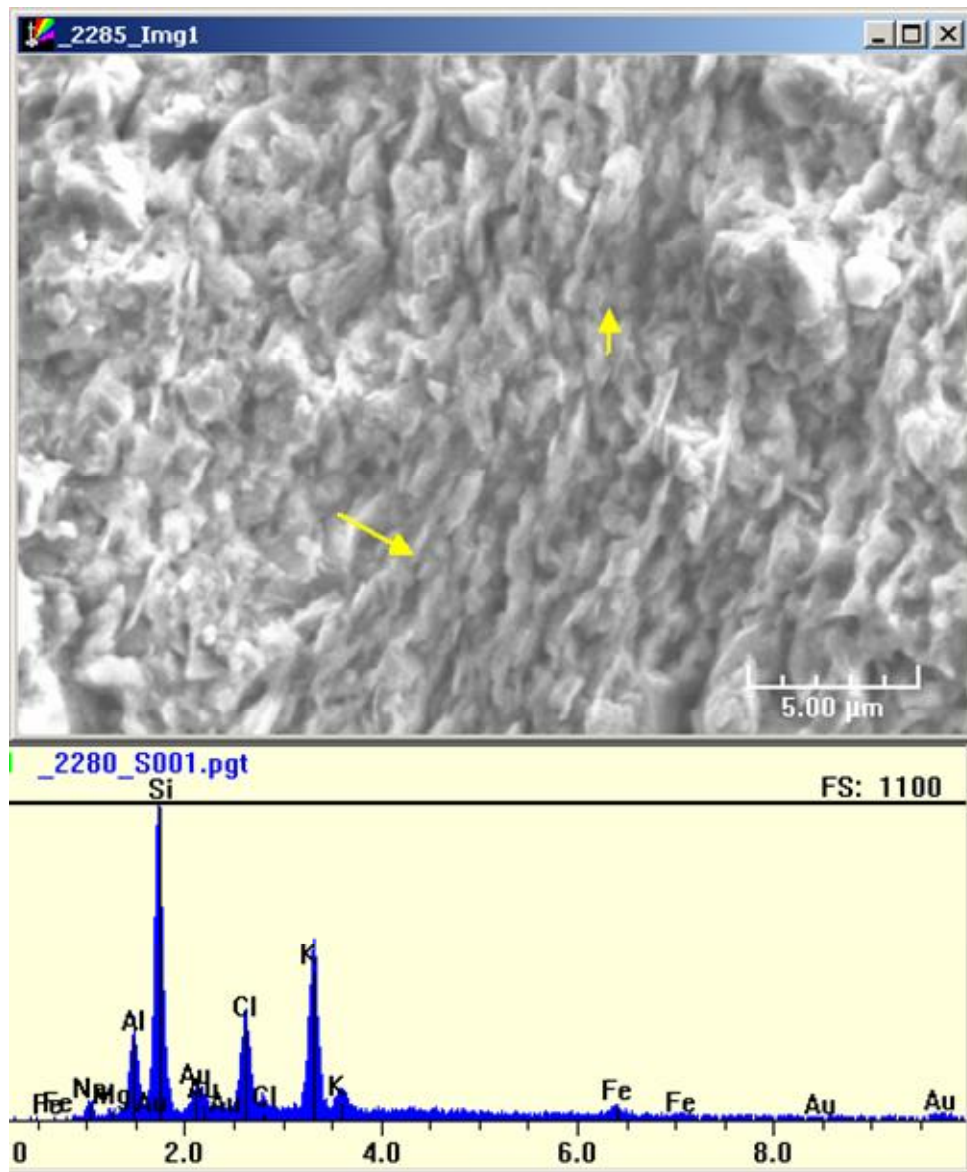
Appendix C.19. Facies D. Sample 4. Well developed dolomite rhombs in potassium feldspar clay matrix.

Scope magnification: 850X



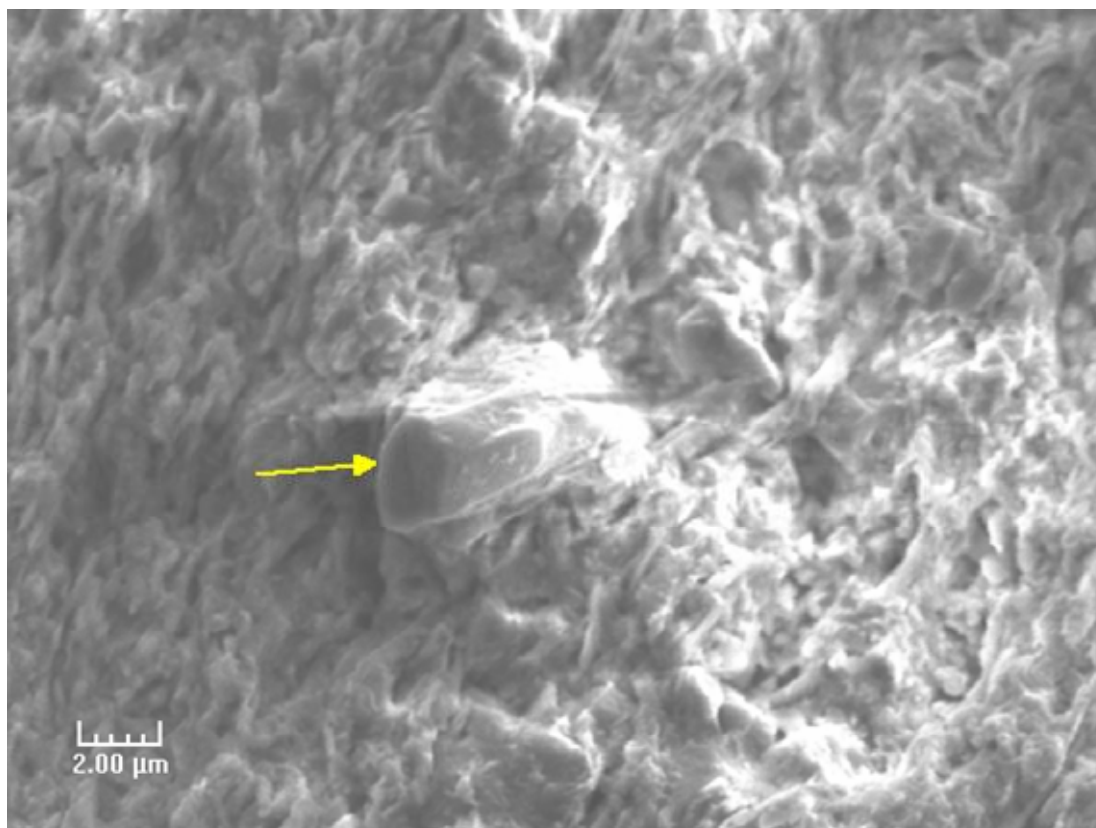
Appendix C.20. Facies A. Sample 5. The matrix of Sample 5 is very complex. This matrix is made up of several very fine-grained minerals. First, the Na and Cl peaks are background noise introduced from the drilling mud. Next the Mg and Ca make up the dolomite component of the matrix. The Mg and Ca is very fine-grained detrital dolomite that cannot be differentiated from the appearance of potassium feldspar. The second component of the Mg and Ca is the background noise of the large dolomite component throughout the Sanish. Next the Al, Si and K is present as three minerals. The first mineral is potassium feldspar that has the potential to be both detrital and authigenic. Next, the Al, Si and K shows up as illite (green arrows) which appears to be overgrowths on the k-spar which indicates an authigenic origin but also is found as detrital illite throughout the sample. Lastly, the very large Si peak is also indicates a very fine-grained detrital quartz component that cannot be differentiated from the detrital k-spar and illite. The XRD indicates there is quartz in the system, it is just too fine-grained to be detected by the EDS.

Scope magnification: 1600X

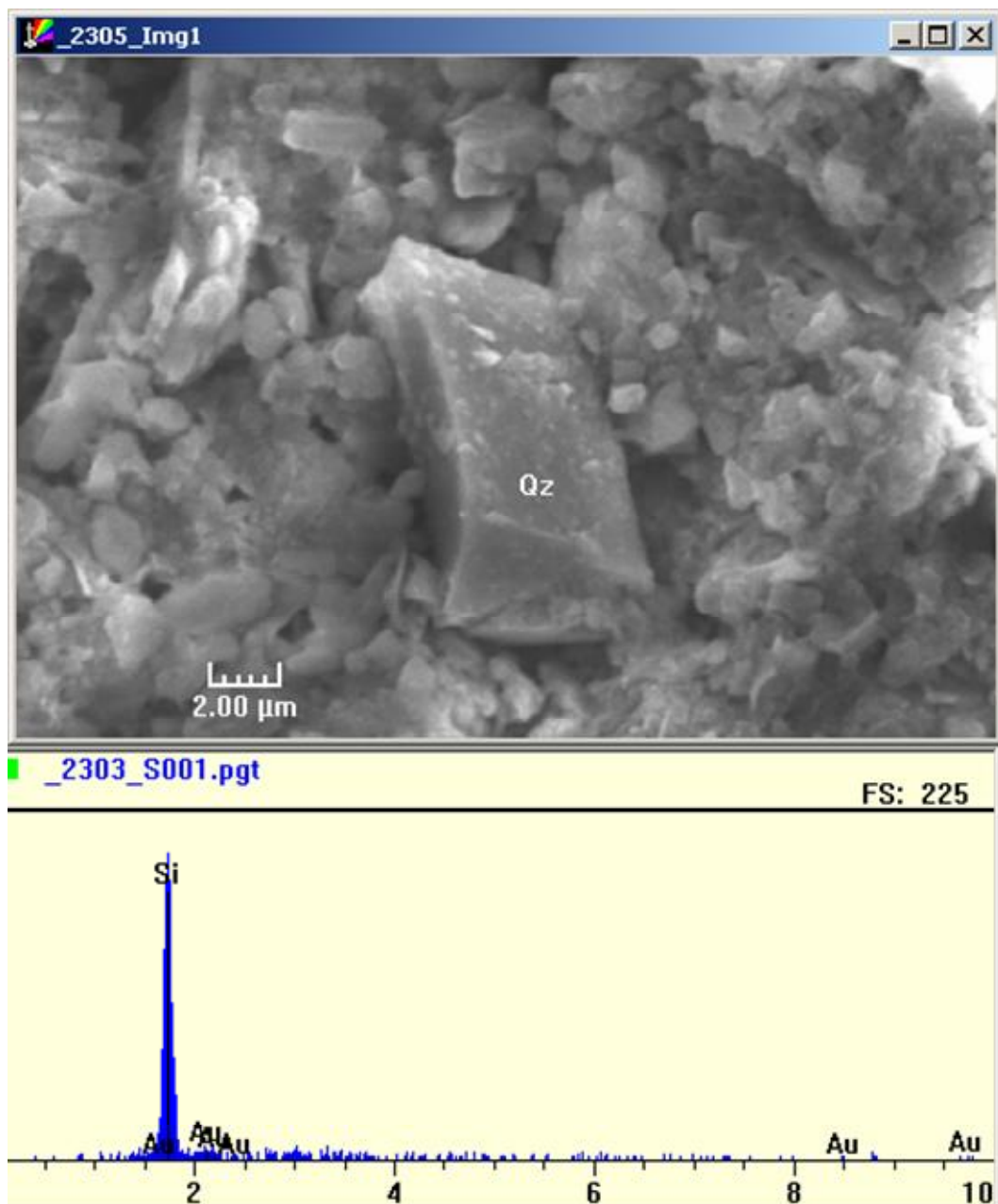


Appendix C.21. Sample 5. Facies A - Detrital illite clay matrix (Al, Si and K). The Na and Cl peaks are background noise from brine of the drilling mud.

Scope magnification: 1200X

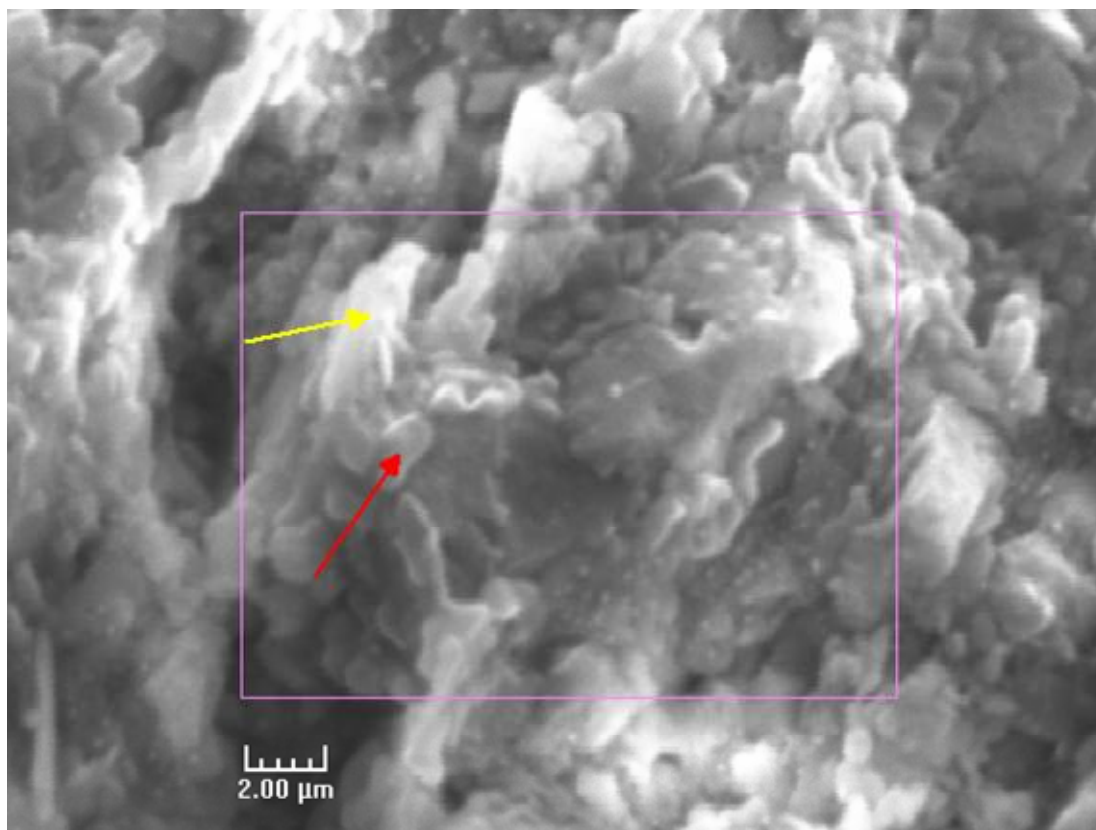


Appendix C.22. Sample 5. Facies A. Detrital quartz grain in the complex clay matrix. Detrital illite is the dominant mineral in the clay matrix. Scope magnification: 900X



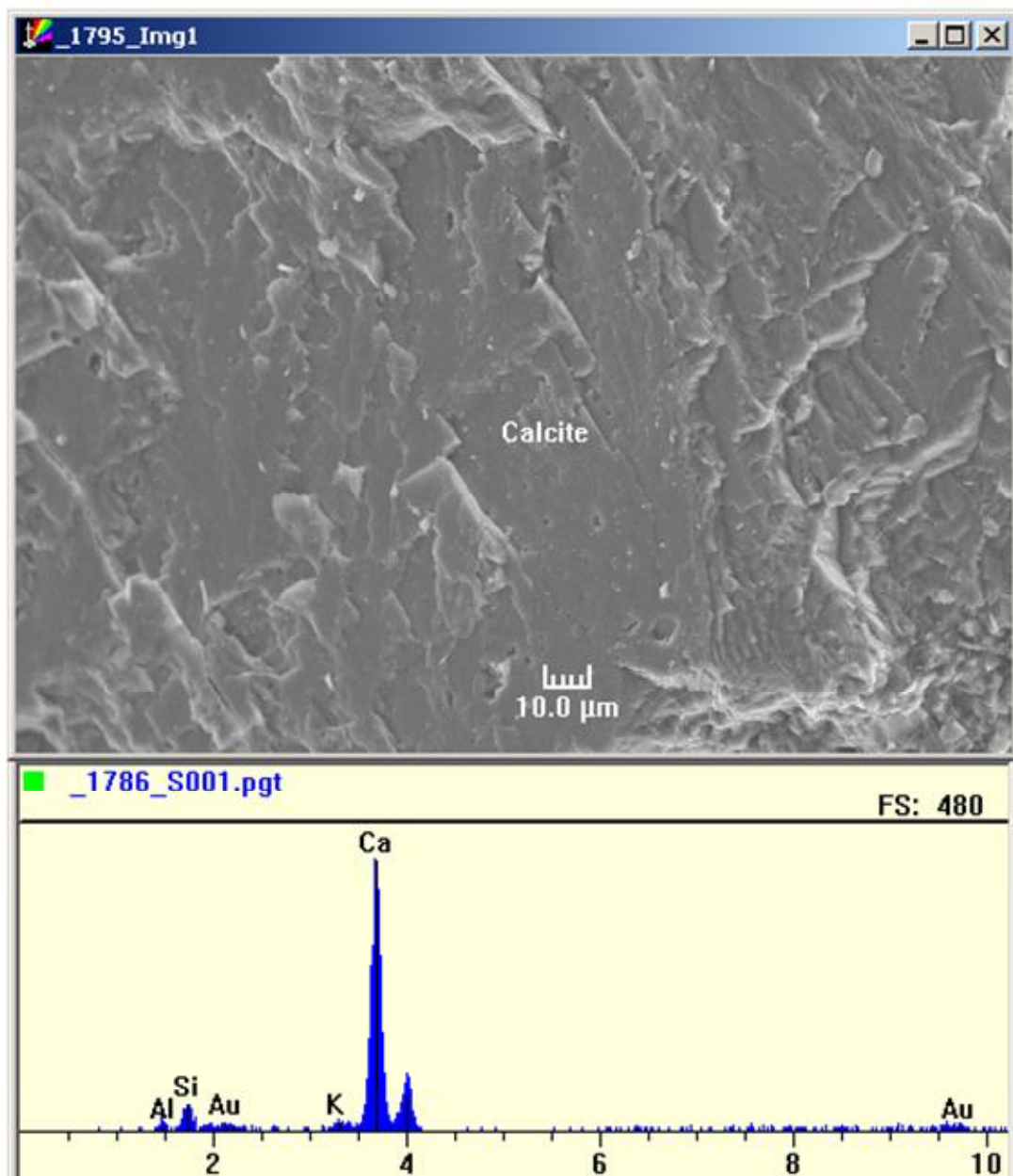
Appendix C.23. Sample 5. Facies A. Angular quartz grain in a potassium feldspar clay matrix.

Scope magnification: 3300X



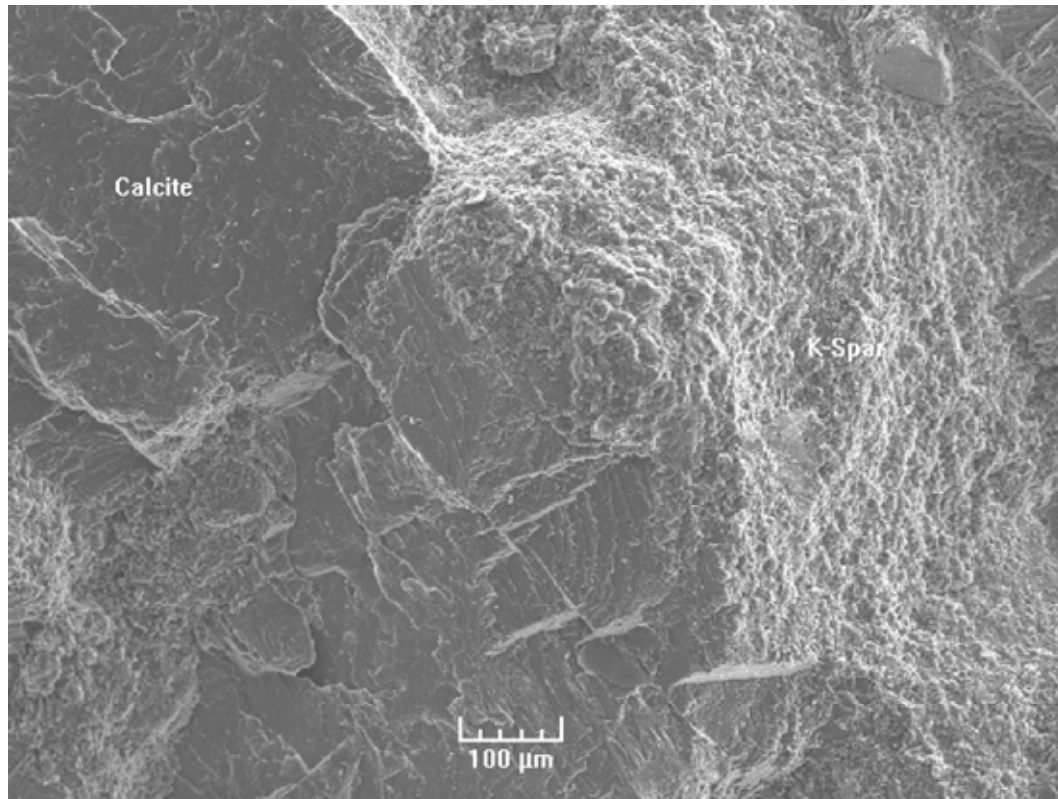
Appendix C.24. Sample 5. Facies A. Dolomite crystal (purple square) with two stages of overgrowth. The first stage of overgrowth is authigenic potassium feldspar (red arrow). The second stage of overgrowths is the authigenic illite (yellow arrow) over the first stage overgrowth of potassium feldspar and dolomite crystals.

Scope magnification: 6000X



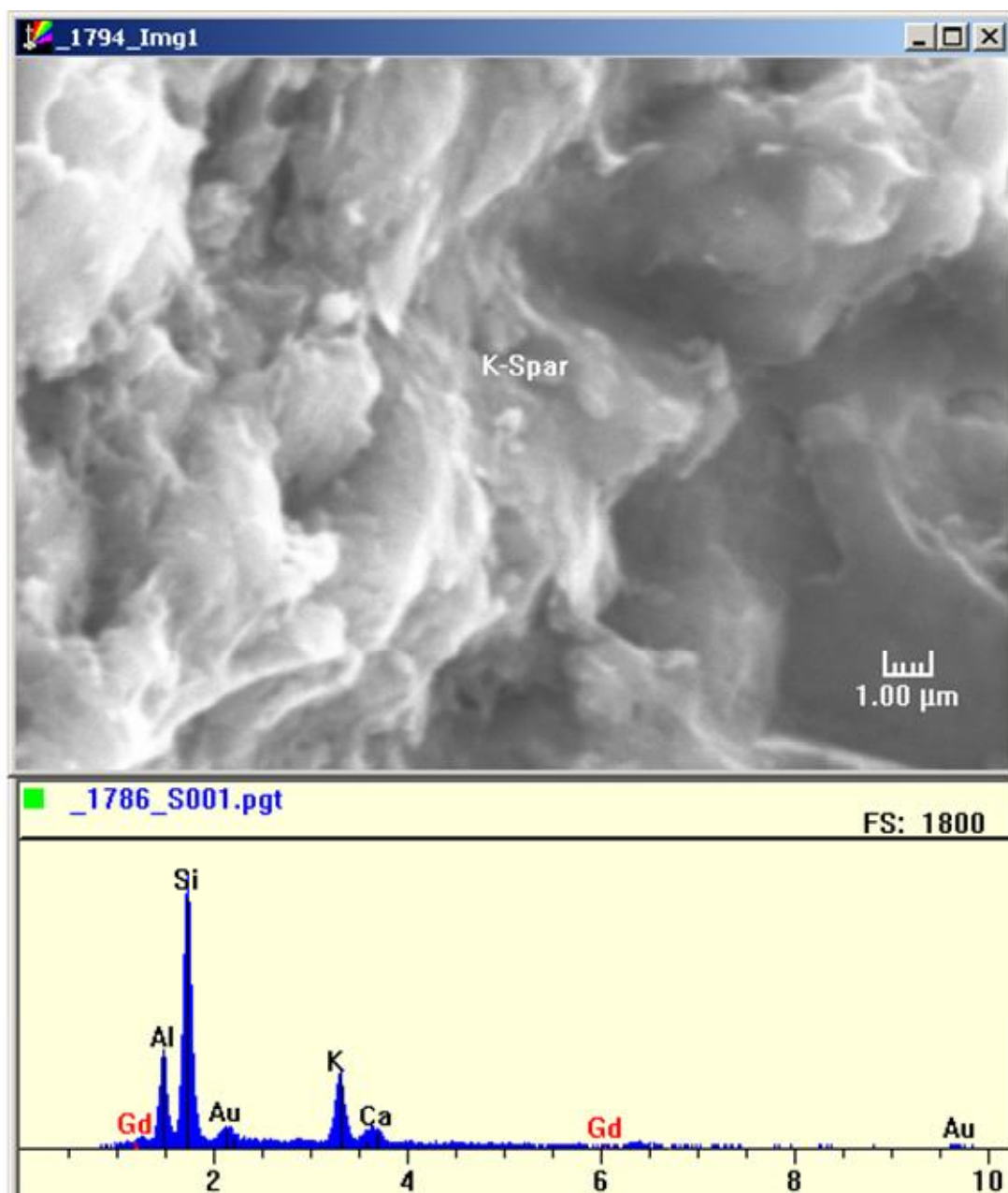
Appendix C.25. Sample 6. Facies D. Calcite.

Scope magnification: 500X



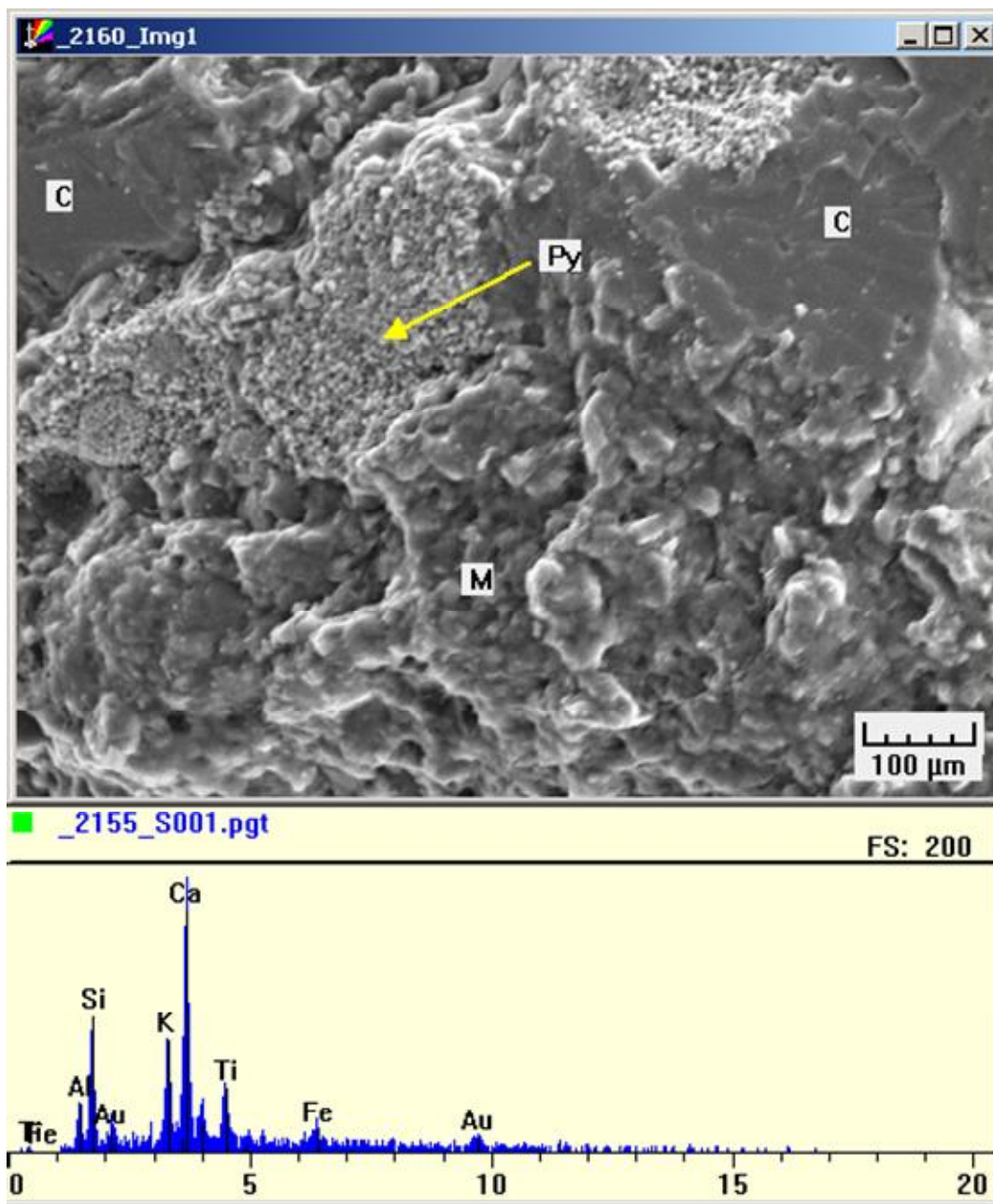
Appendix C.26. Facies D. Calcite with grain coating authigenic k-spar.

Scope magnification: 110X



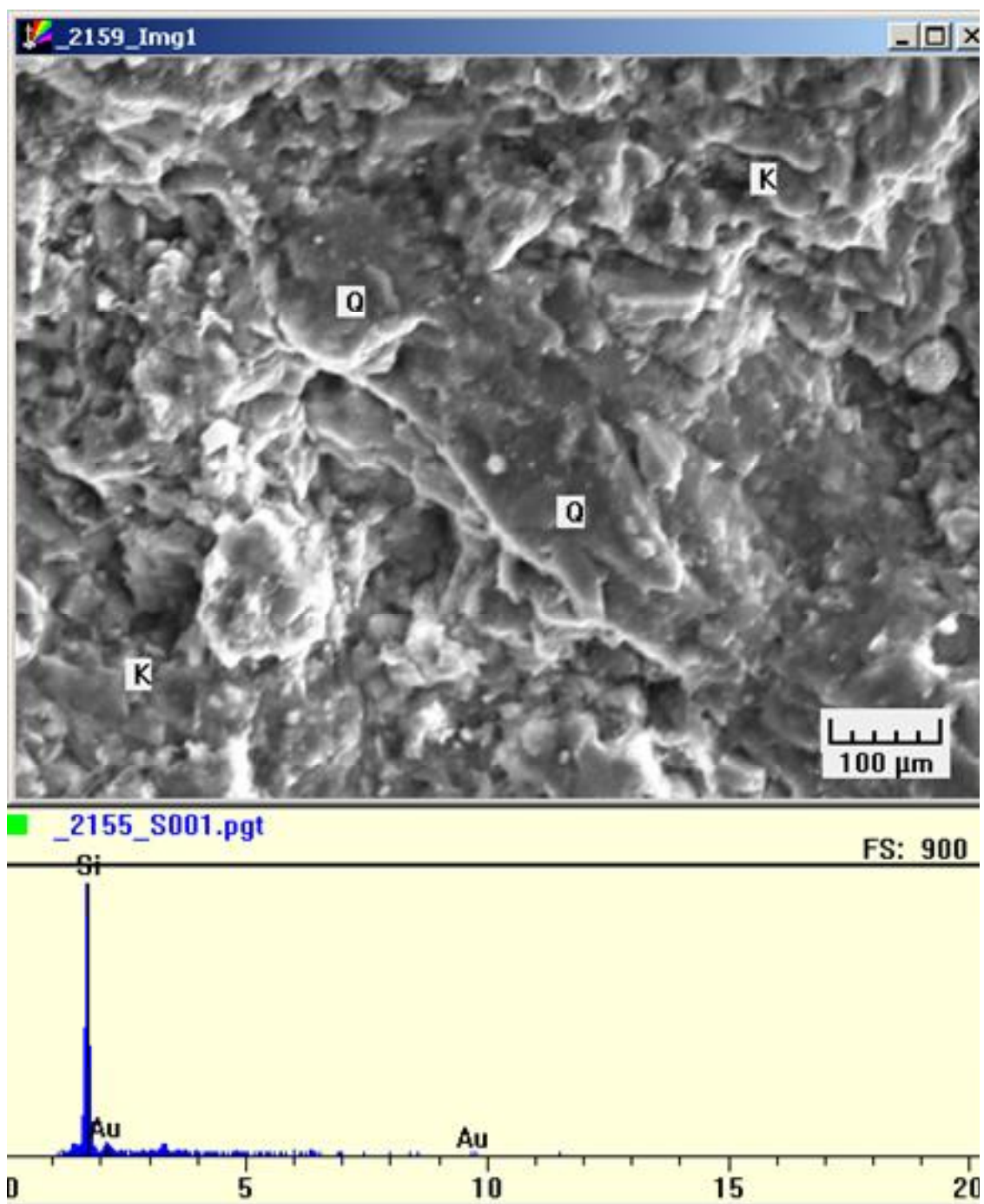
Appendix C.27. Sample 6. Facies D. Zoomed in view of the grain coating authigenic potassium feldspar.

Scope magnification: 5000X



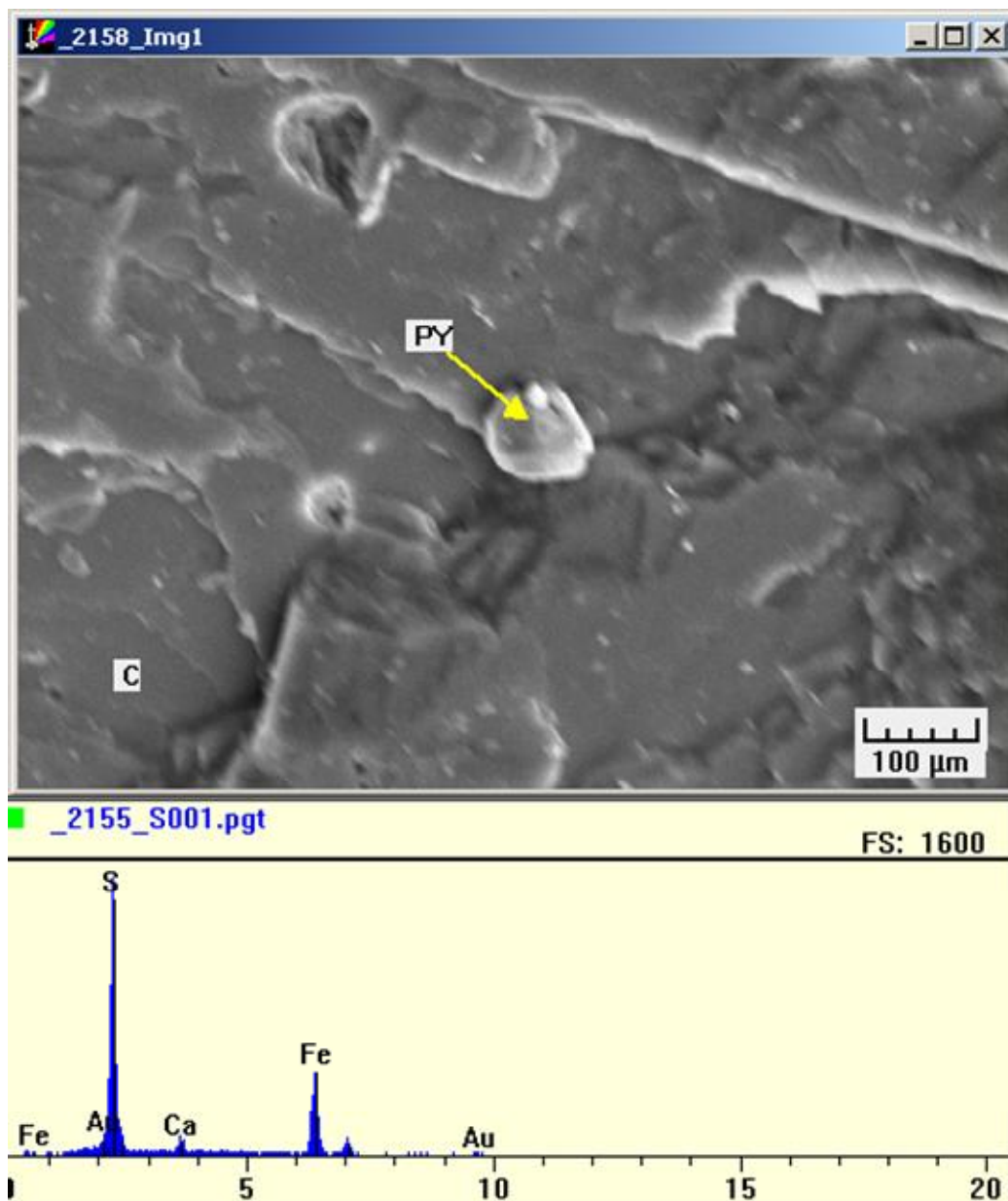
Appendix C.28. Sample 6. Facies D. Authigenic grain coating pyrite (Py), authigenic grain coating muscovite (M) – Al, Si, K, Ti, Ca and Fe are background noise from the calcite and pyrite nearby. Calcite grain (C).

Scope magnification: 700X



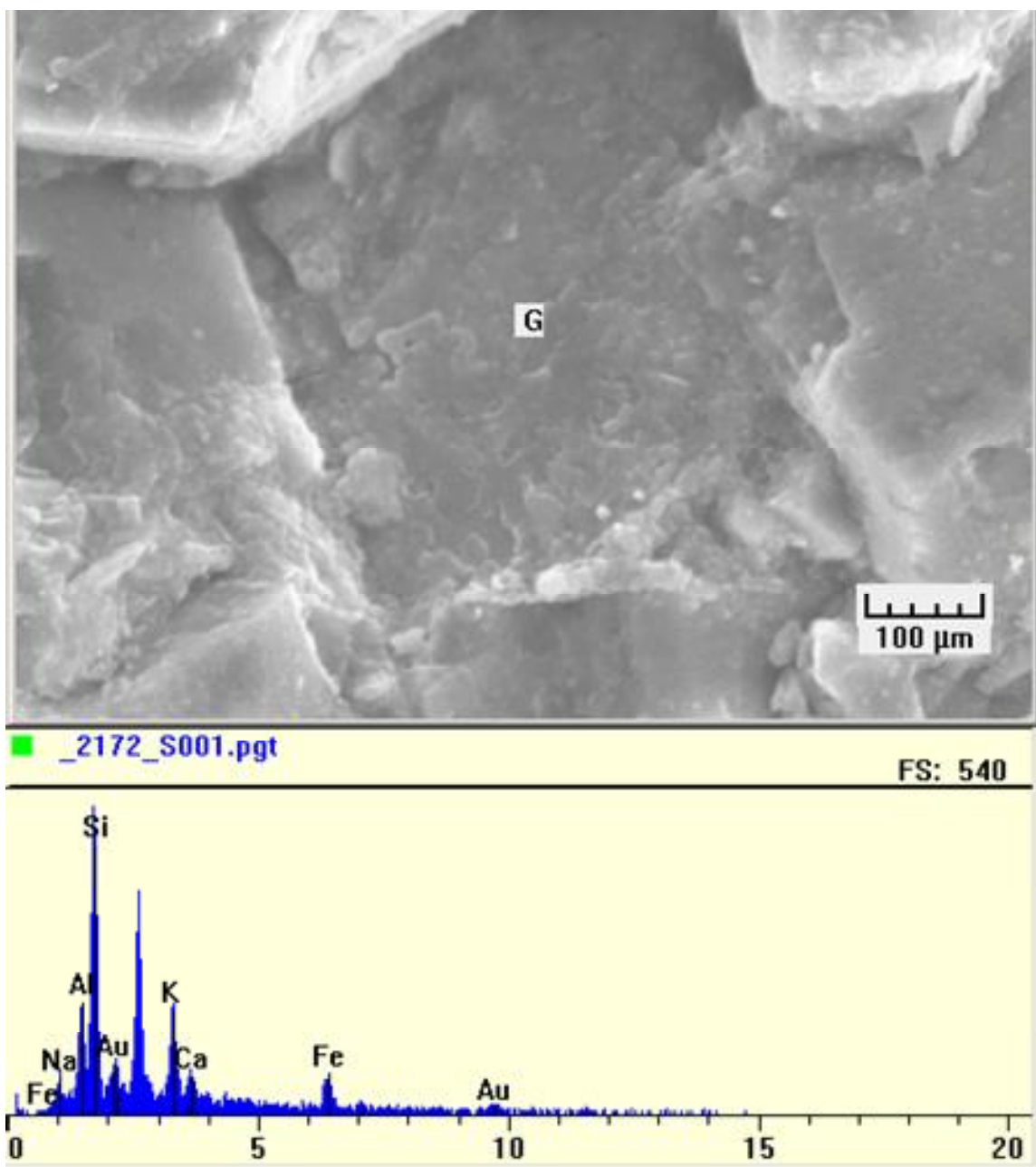
Appendix C.29. Sample 6. Facies D. Detrital quartz grain within potassium feldspar clay matrix

Scope magnification: 850X



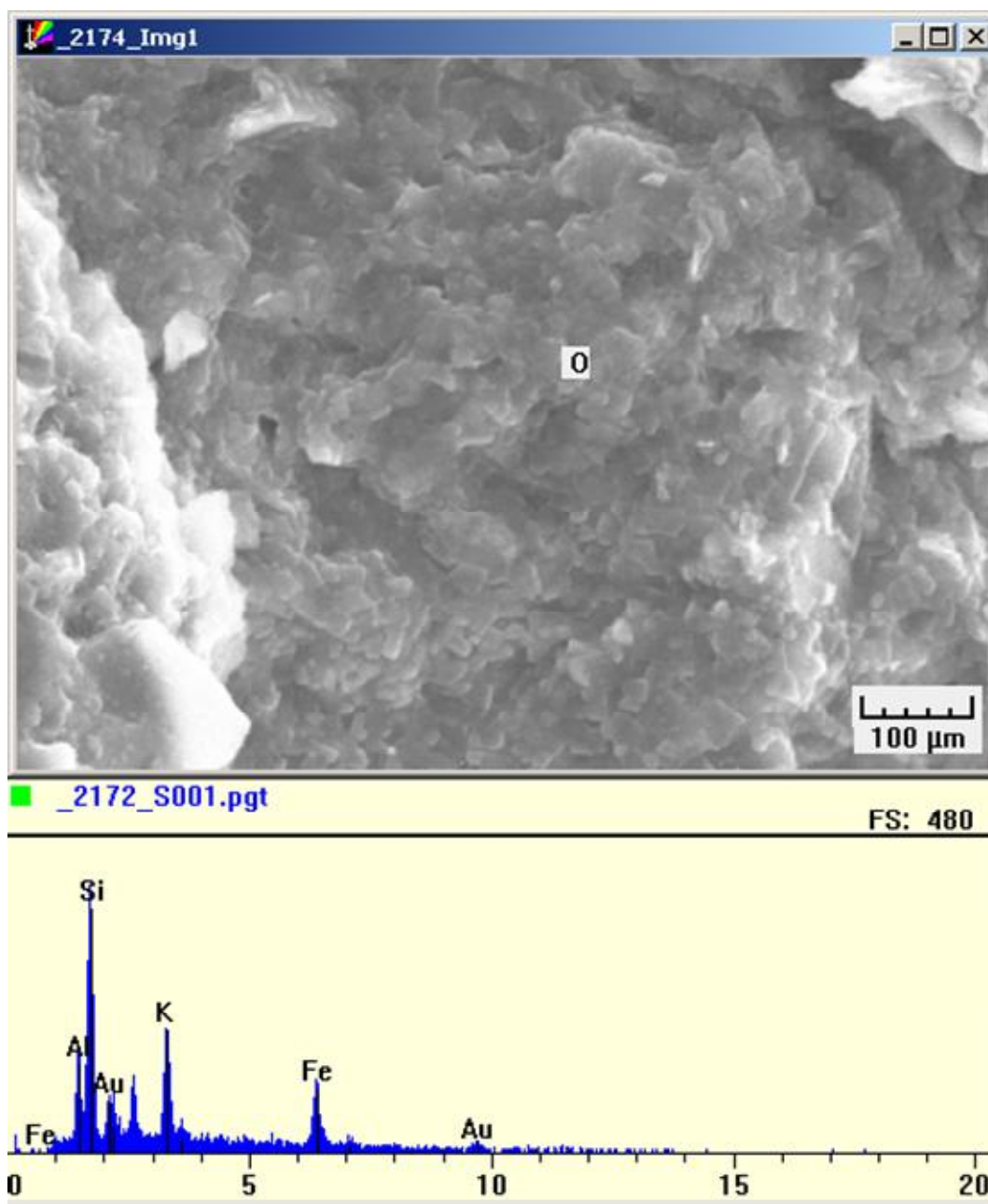
Appendix C.30. Sample 6. Facies D. Detrital pyrite grain on top of calcite crystal.

Scope magnification: 1300X



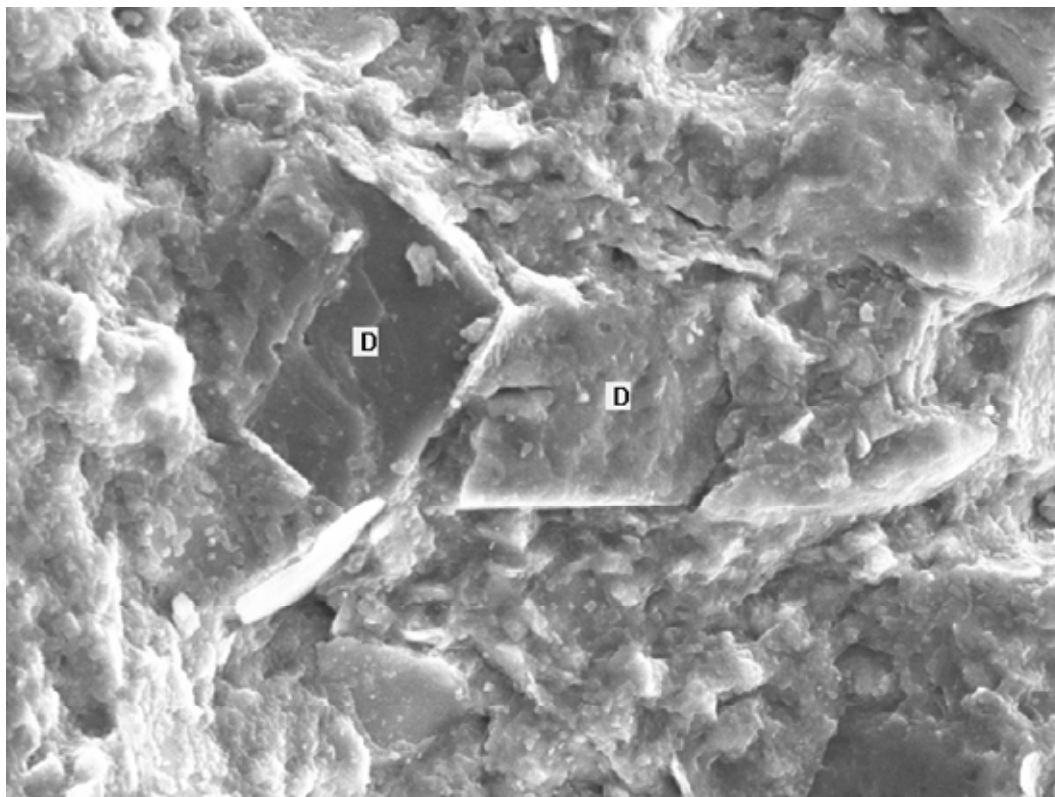
Appendix C.31. Sample 7. Facies D. Grain (G) is potassium feldspar due to the Al and K peak being near the same height. The Na and Cl peaks are background noise from the drilling fluid while the Fe is a background noise from the high Fe in the system.

Scope magnification: 2500X



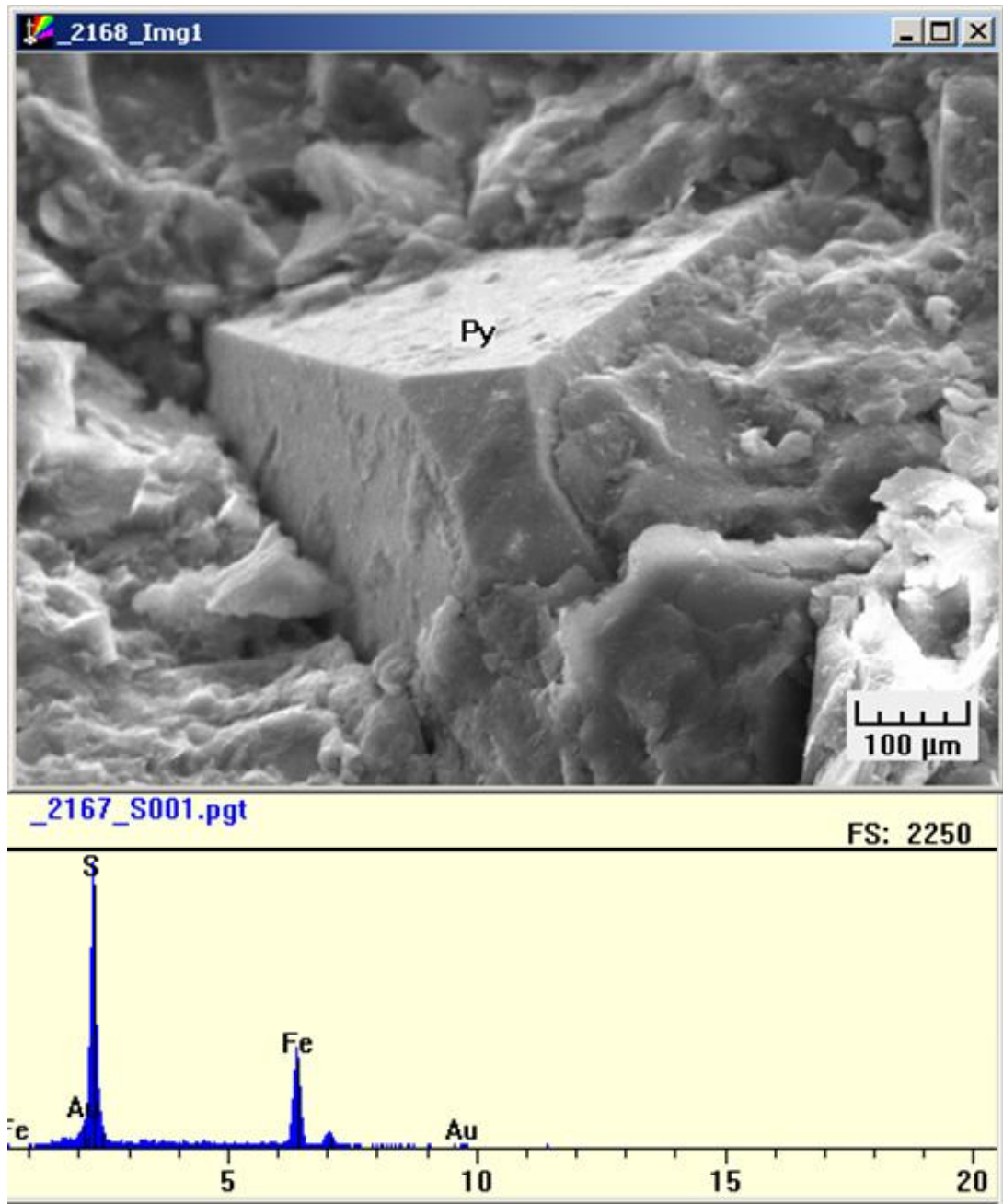
Appendix C.32. Sample 7. Facies D. Authigenic potassium feldspar overgrowths (O). Fe is found throughout the samples and is a contaminant in the system.

Scope magnification: 2300X



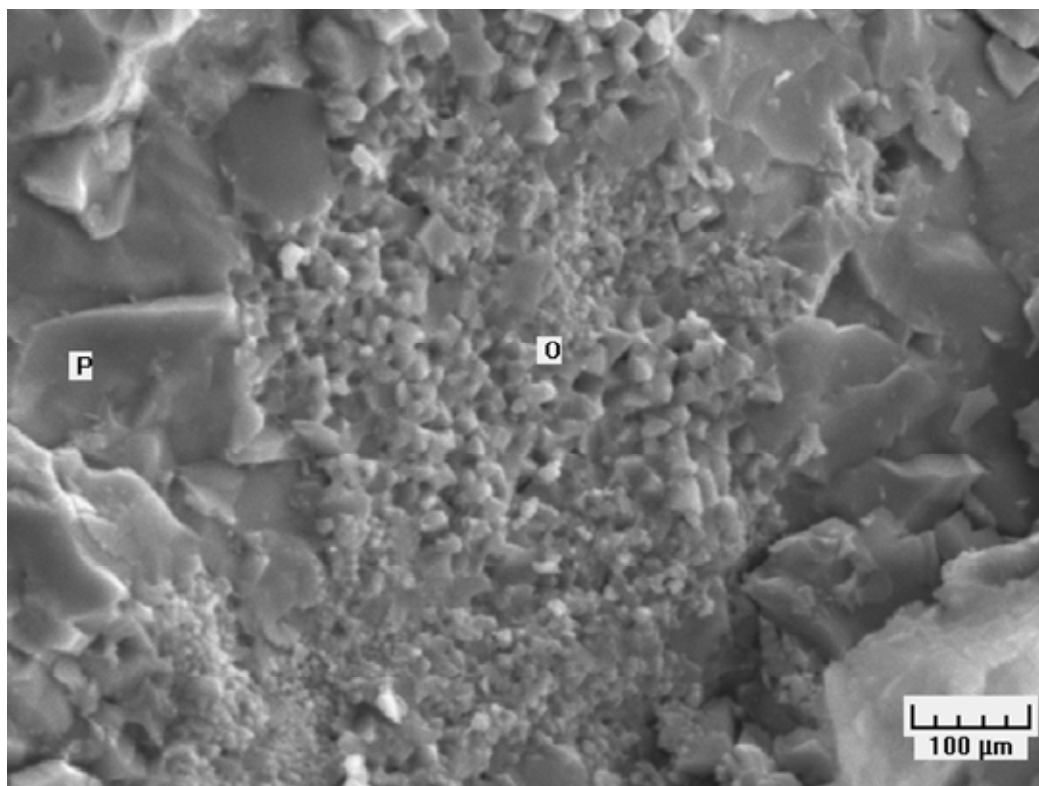
Appendix C.33. Sample 7. Facies D. Authigenic dolomite rhombs grains in the potassium feldspar clay matrix.

Scope magnification: 1300X



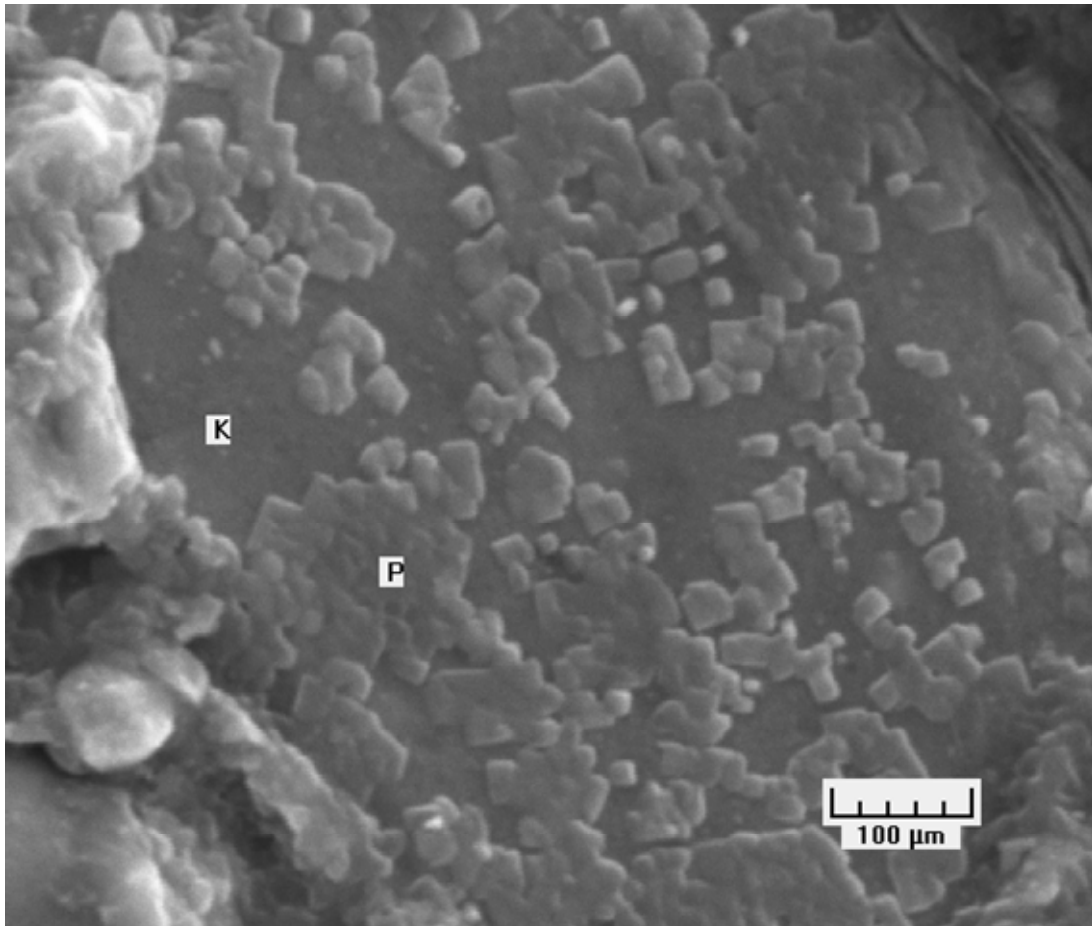
Appendix C.34. Sample 7. Facies D. Authigenic pyrite grain in the potassium feldspar clay matrix.

Scope magnification: 1300X



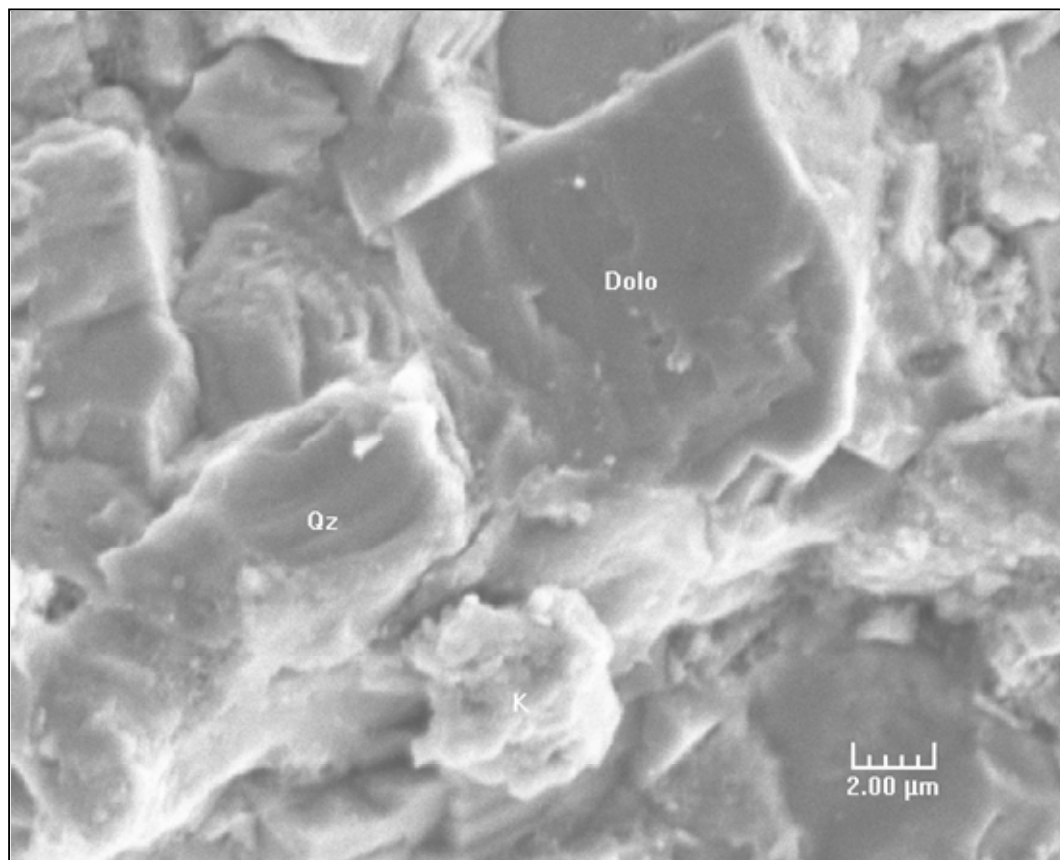
Appendix C.35. Sample 7. Facies D. Authigenic pyrite grains (P) with authigenic pyrite overgrowths (O).

Scope magnification: 2500X



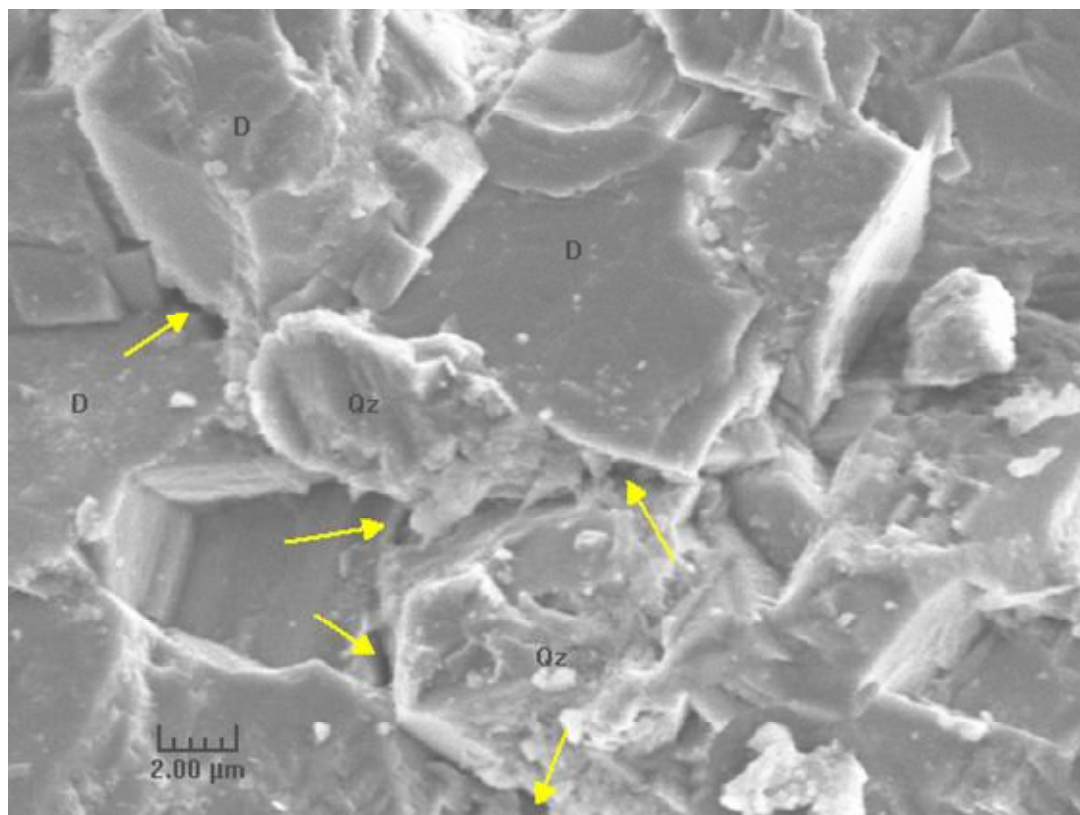
Appendix C.36. Sample 7. Facies D. Potassium feldspar grain (K) with plagioclase feldspar (P) overgrowth.

Scope magnification: 3300X



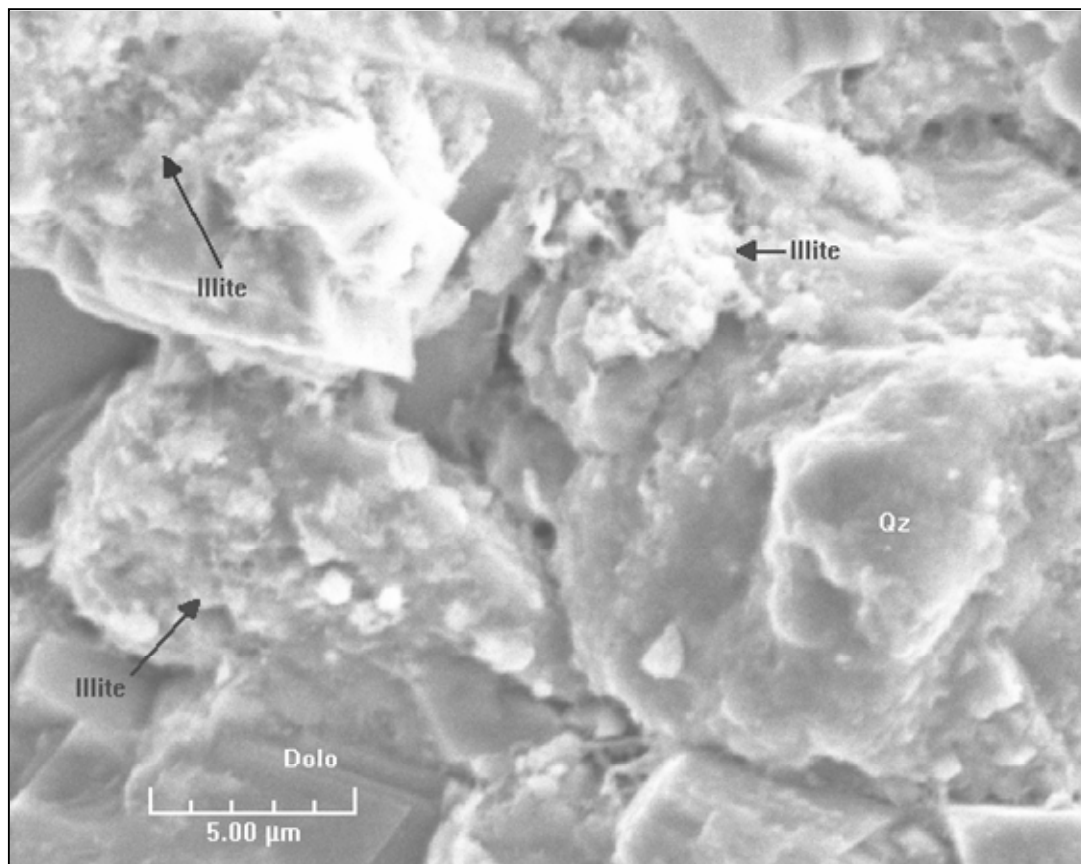
Appendix C.37. Sample 8. Facies D. Authigenic dolomite rhombs (Dolo) matrix, detrital quartz (Qz), and k-spar grain (K).

Scope magnification: 1300X



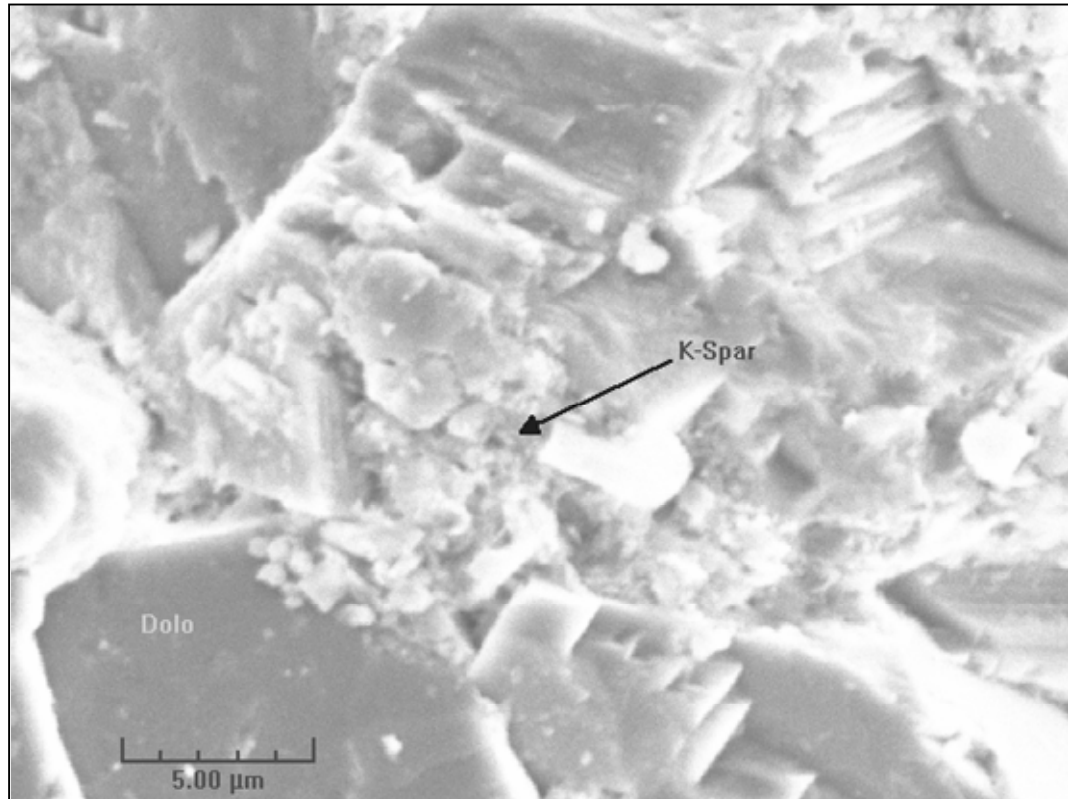
Appendix C.38. Sample 8. Facies D. Authigenic dolomite (D) and detrital quartz (Qz) matrix with micro-porosity (yellow – arrows).

Scope magnification: 900X



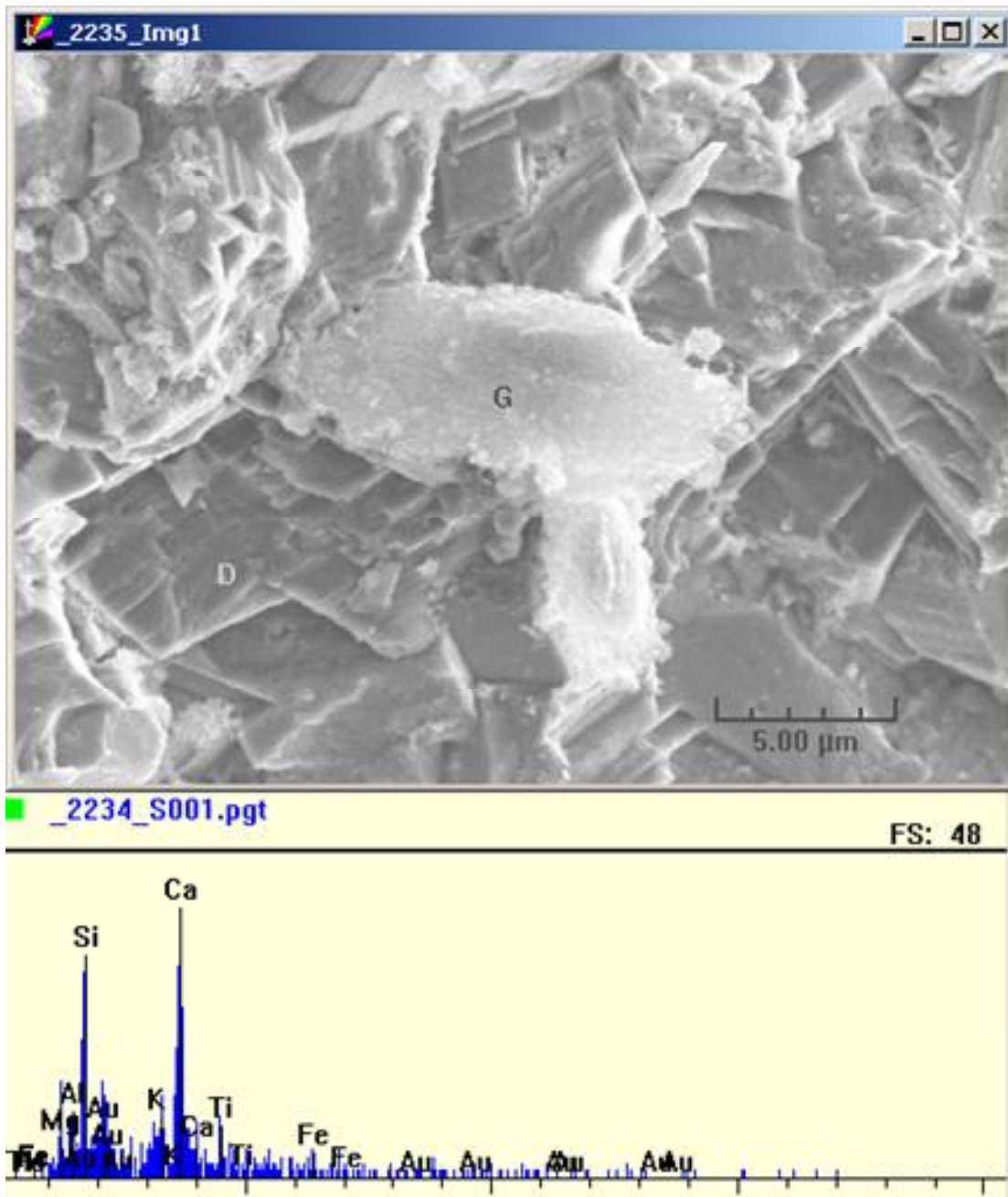
Appendix C.39. Sample 8. Facies D. Grain coating authigenic illite on authigenic dolomite (Dolo) and detrital quartz (Qz).

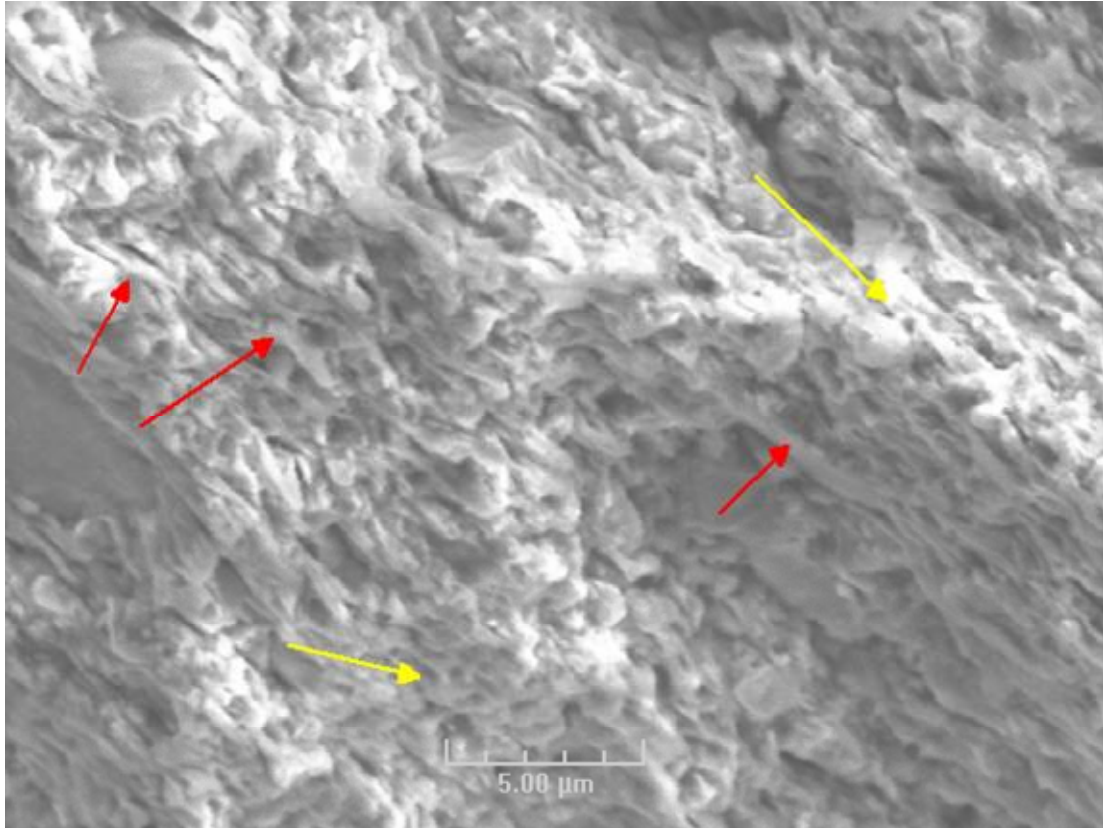
Scope magnification: 1400X



Appendix C.40. Sample 8. Facies D. Authigenic grain coating potassium feldspar (K-spar) on authigenic dolomite (Dolo).

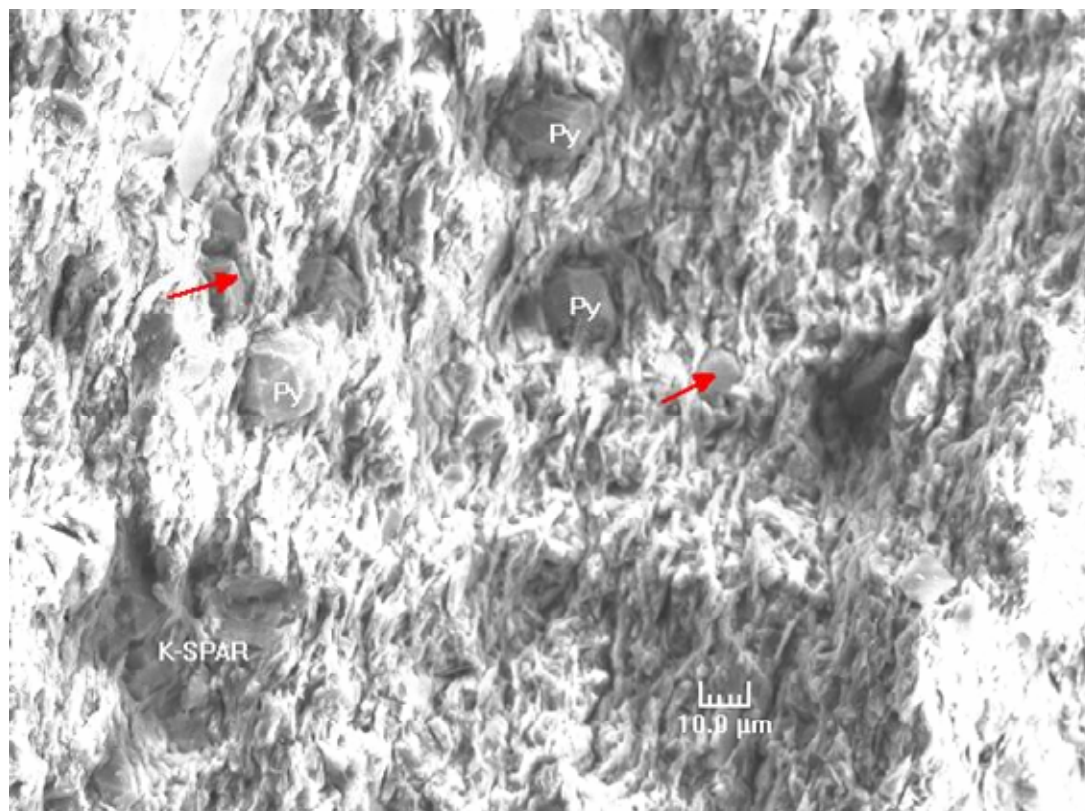
Scope magnification: 1600X





Appendix C.42. Sample 9. Facies D. Dolomite Mudstone. Detrital clay matrix. The red arrows indicate a detrital illite clay matrix composed of irregular flake-like structures that are oriented parallel to each other. The potassium feldspar (yellow arrows) occurs as detrital clays.

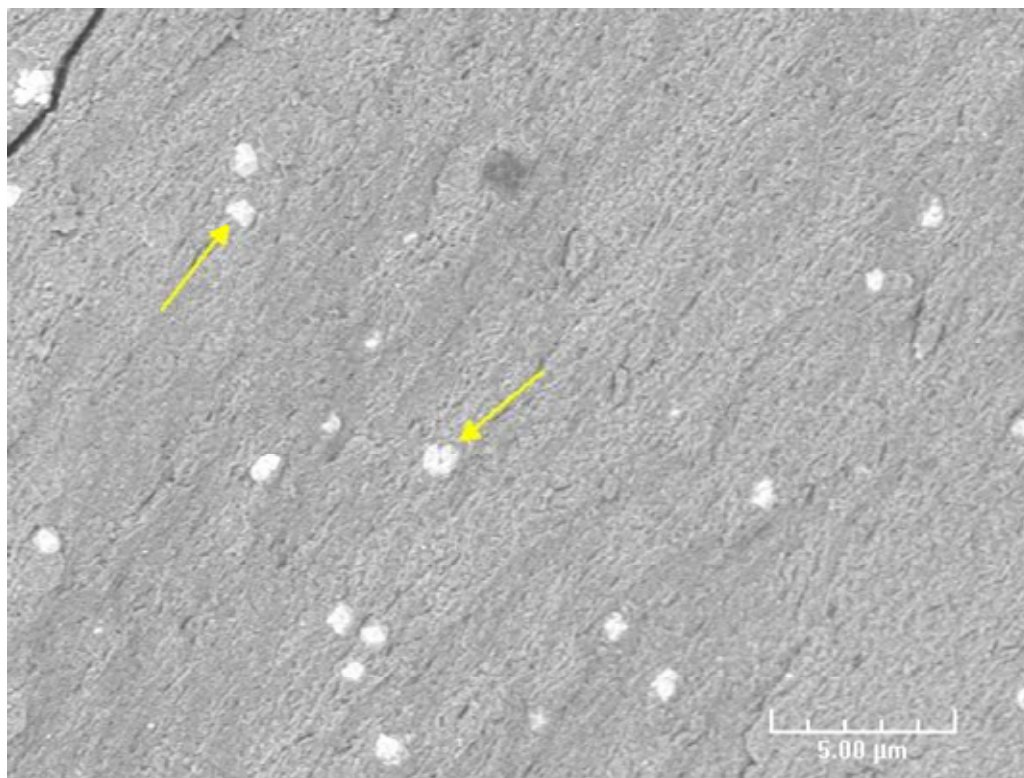
Scope magnification: 950X



Appendix C.43. Sample 9. Facies D. Dolomite – Mudstone. Detrital illite and k-spar matrix with pyrite grains (Py), red arrow points to pyrite grains.

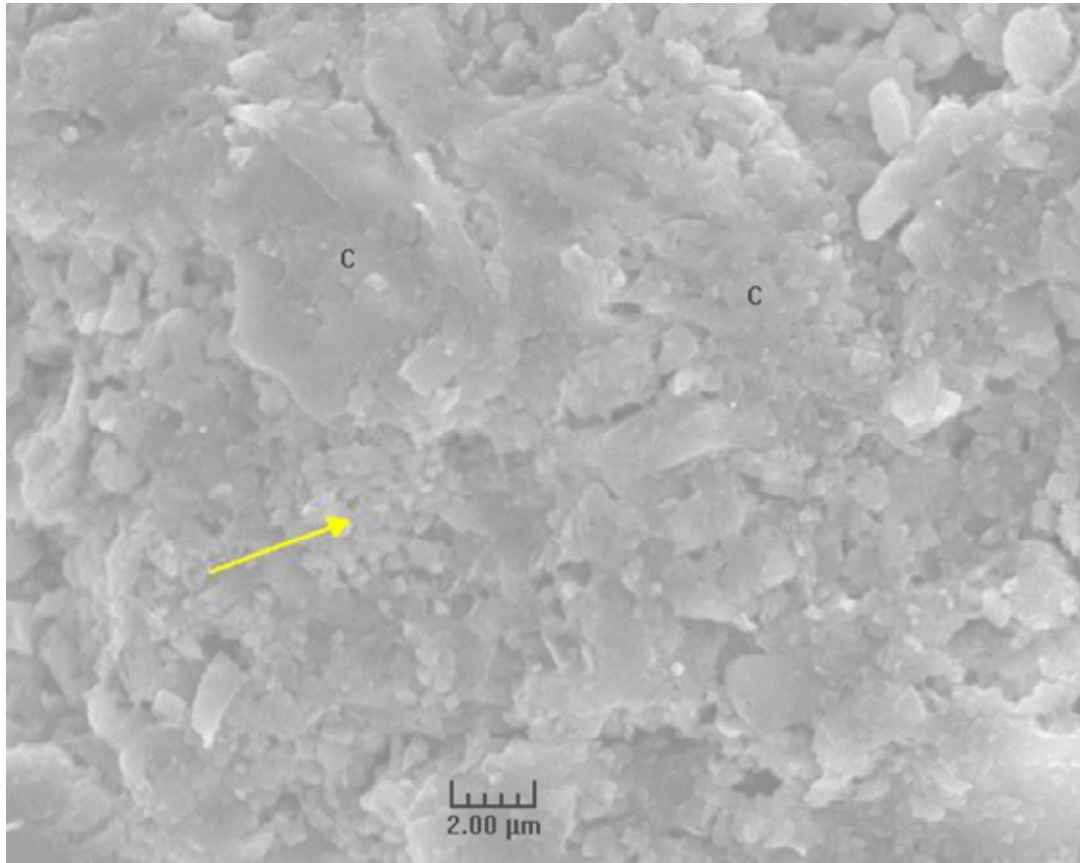
Appendix C.43. Sample 9. Facies D. Dolomite – Mudstone. Detrital illite and k-spar matrix with pyrite grains (Py), red arrow points to pyrite grains.

Scope magnification: 500X



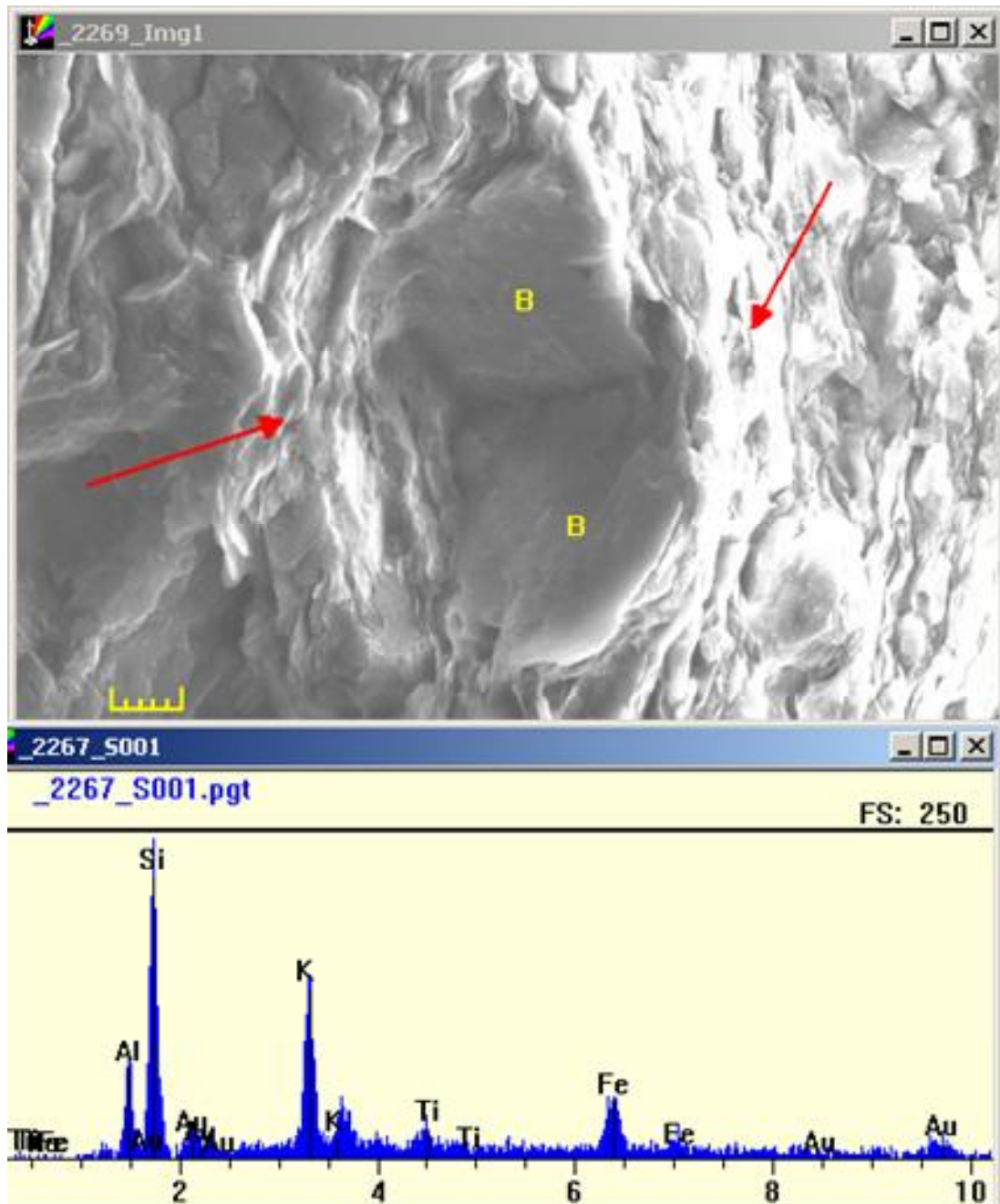
Appendix C.44. Sample 9. Facies D. Dolomite – Mudstone. Back scatter imaging of sample 9 which shows the detrital clay matrix with authigenic pyrite inclusions (yellow arrow).

Scope magnification: 220X

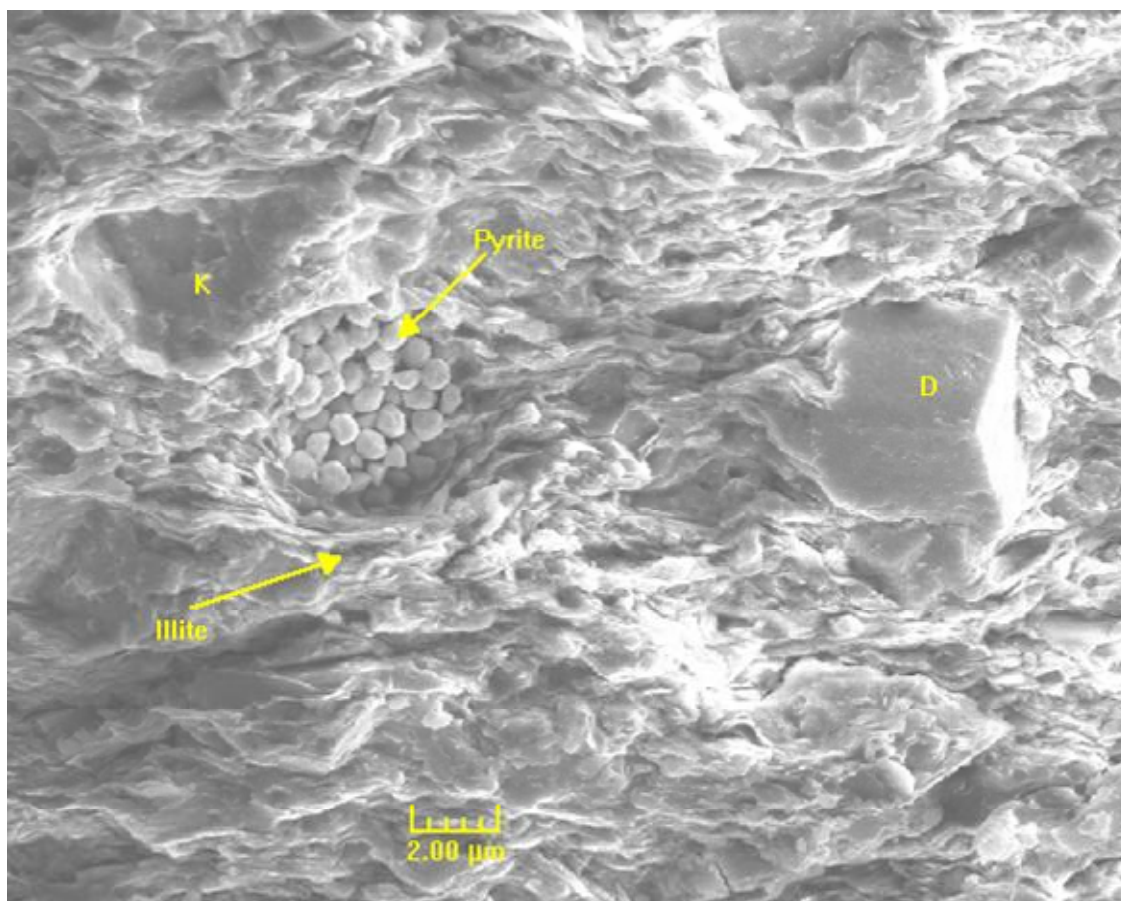


Appendix C.45. Sample 10. Facies D. Dolomite Siltstone. Quartz grains (C) with authigenic potassium feldspar overgrowths (yellow arrow).

Scope magnification: 2000X

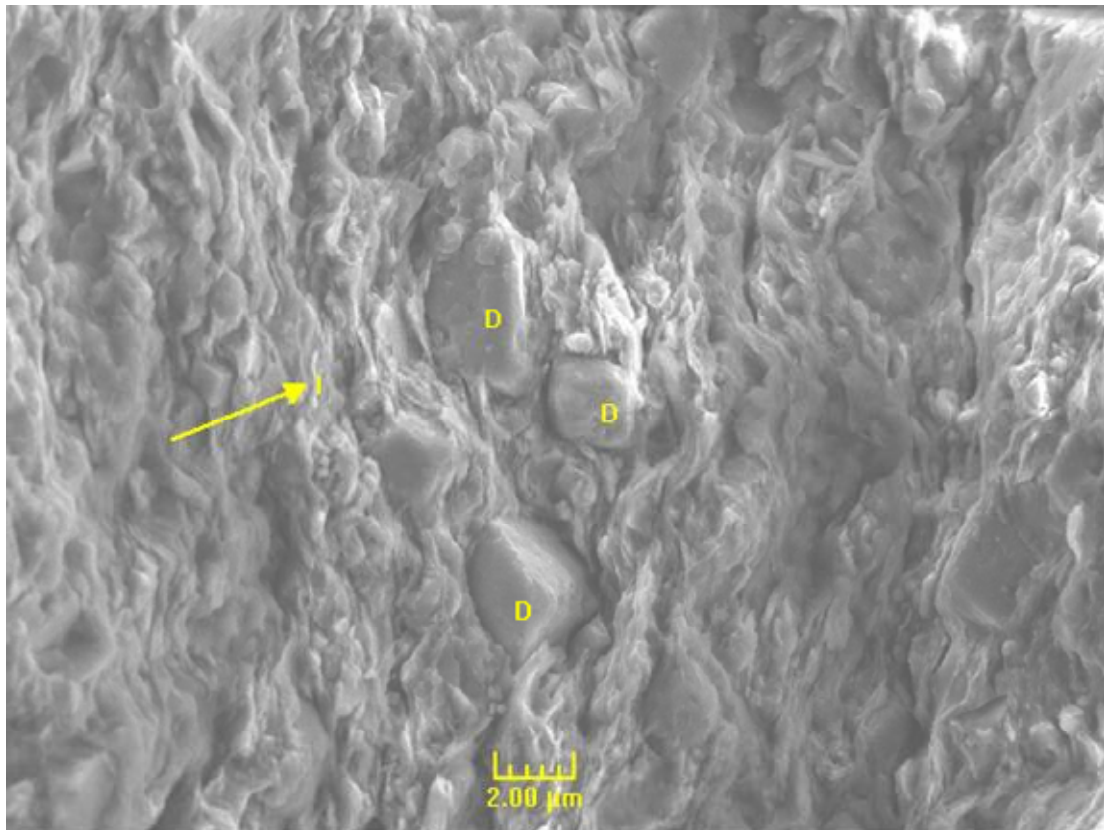


Appendix C.46. Sample 11. Facies LBS. Detrital illite clay matrix (red arrows) with detrital biotite (B) clasts. Biotite consists of Si, Al, K, Mg, and Fe. The Mg is present in low concentrations. Scope magnification: 1600X.



Appendix C.47. Sample 11. Facies LBS. Clay matrix is a mixture of detrital illite and potassium feldspar. Authigenic framboidal pyrite inclusions and authigenic dolomite rhombohedra are found within the clay matrix.

Scope magnification: 850X.



Appendix C.48. Sample 11. Facies LBS. Detrital illite dominate clay matrix with authigenic dolomite clasts.

Scope magnification: 950X.