ICCP COMMISSION III

Self – heating of coal and coal wastes working group

2009 Round Robin Exercise

Conveyors:
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Aims of the 2009 Round Robin Exercise:

- to gather examples of various forms of transformation of organic matter in coal and coal wastes
- to attempt a classification of these self-heating induced transformations

The list of participants:

- Sławomira Pusz (Polish Academy of Sciences, Poland)
- James Hower (University of Kentucky, USA)
- Ivana Sýkorová (Academy of Sciences of the Czech Republic)
- Jen O'Keefe (Morehead State University, USA)
- Deolinda Flores (Universidade do Porto, Portugal)
- Claudio Avila (University of Nottingham, Great Britain)
- Dragana Životić (University of Belgrade, Serbia)
- Joana Ribeiro (Universidade do Porto, Portugal)
- Manuela Marques (Universidade do Porto, Portugal)
- Nikki Wagner (University of Witwatersrand, South Africa)
- Isabel Suárez-Ruiz (Instituto Nacional del Carbón, Spain)
- Stavros Kalaitzidis (University of Patras, Greece; BMA Geological Services, Australia)
- Kimon Christanis (University of Patras, Greece)

Localities of samples:

- WG1 – Inner Mongolia Autonomus Region, Wuda Coal Field, Republic of China, R_r = 1.0%
- WG2 – Portugal, metaanthracite waste pile, R_r = 4.10 - 6.25%
- WG3 – Marcel and Rymer Cones waste coal piles, Upper Silesian Coal Basin, Poland, R_r = 0.7%
- WG4 – South Africa
- WG5 – Mulga, the Warrior Basin, USA, R_r = 1.07%
- WG6 – Starzykowiec coal waste dump, Upper Silesian Coal Basin, Poland, R_r = 0.6 – 0.7%
- WG7 – Piekary Śląskie coal waste dump, Upper Silesian Coal Basin, Poland, R_r = 0.6%
- WG8 – coal heaps and coal wastes, Republic of South Africa, R_r = 0.6 – 0.7%

Cathegories of transformed organic matter in coal and coal wastes:

1. Cracks and microfractures
2. Oxidation rims (paler and darker in colour)
3. Plasticised particles (particles with porosity and particles with plasticised edges)
4. Bands
5. Paler in colour particles
6. Coke (massive: isotropic, anisotropic; porous)
7. Inertinite
8. Pyrolytic carbon
9. Natural chars
10. Unaltered particles

Main observations during evaluation:

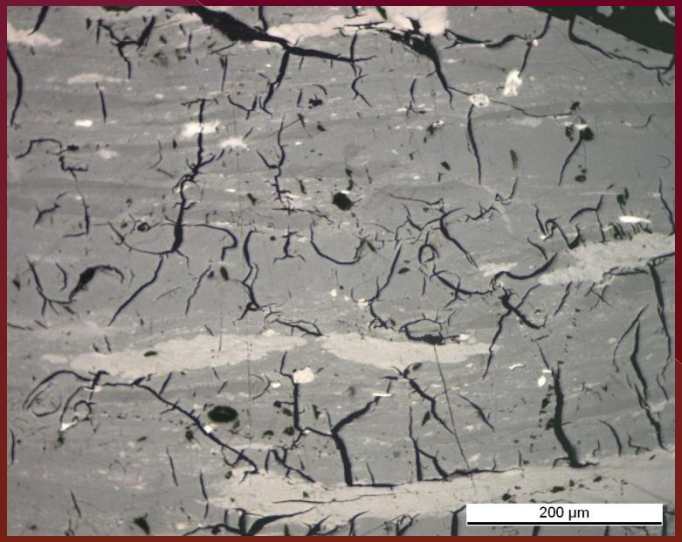
- Description of forms instead of symbols of the given group
- 2 and more categories were used to describe a given form
- Forms that were not included in our proposed classification
- Blank spaces or question marks were left
- Mineral matter was recognized

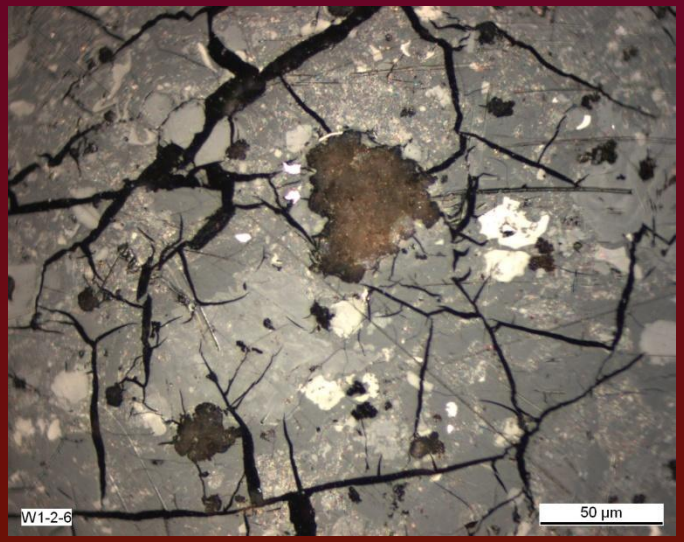
Not sure what I am seeing

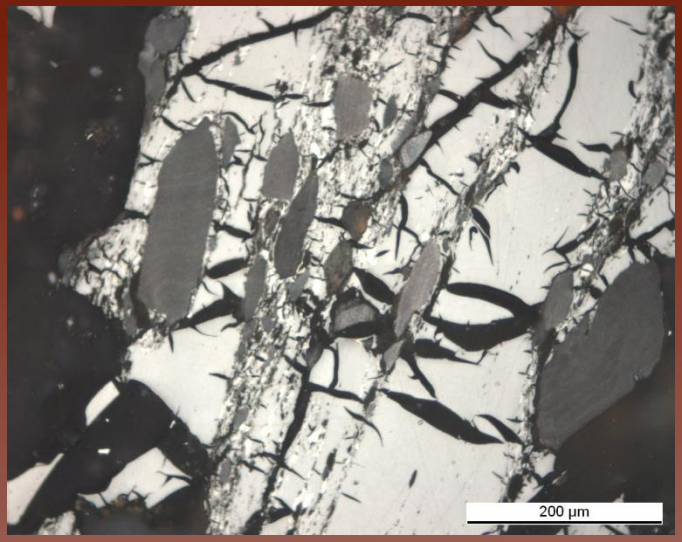
Levels of agreement

Level of agreement (%)	Number of forms	Percentage of all forms
100.0	35	16.51
92.3	27	12.74
84.6	17	8.01
76.9	23	10.85
69.0	18	8.49
61.5	14	6.60
53.4	15	7.08
Sum	149	70.28
< 50	63	29.72

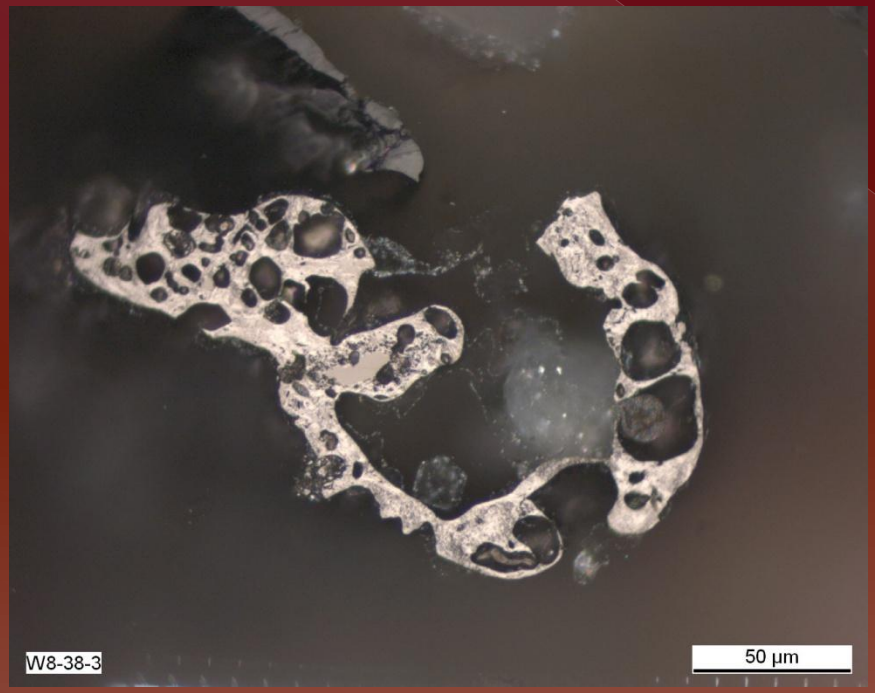
Cracks, microfissures

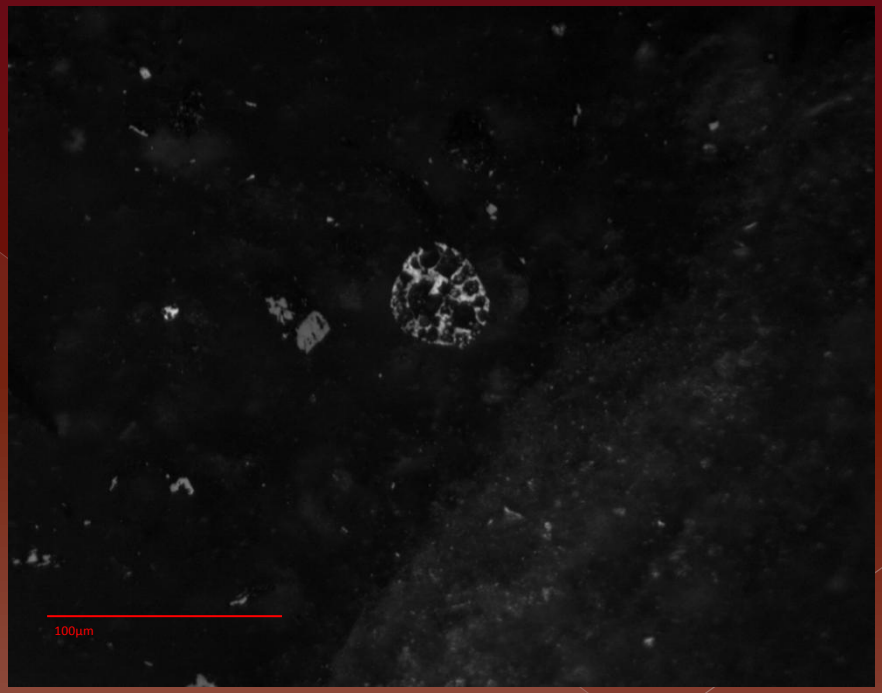




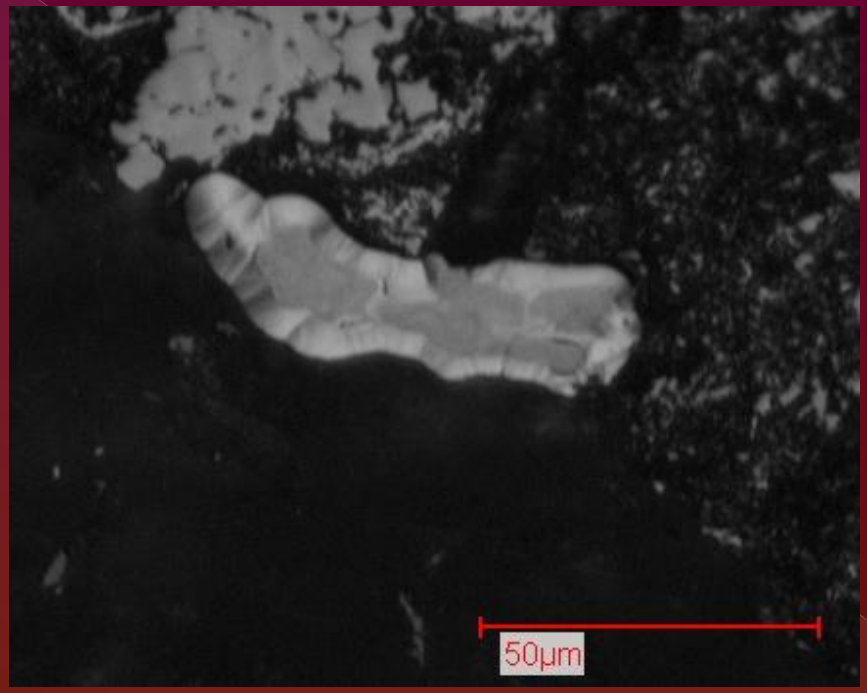


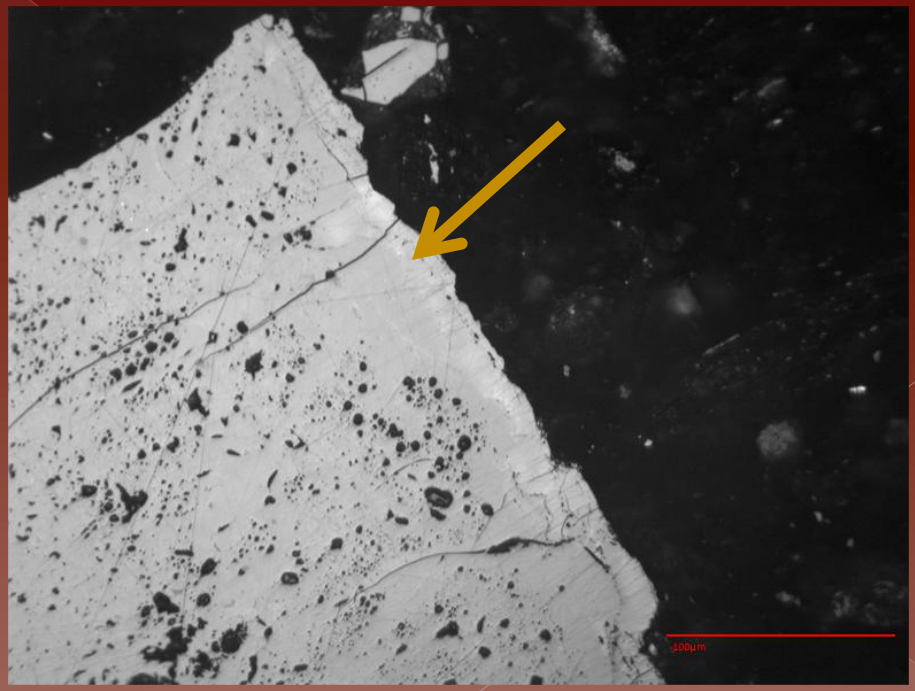
Char



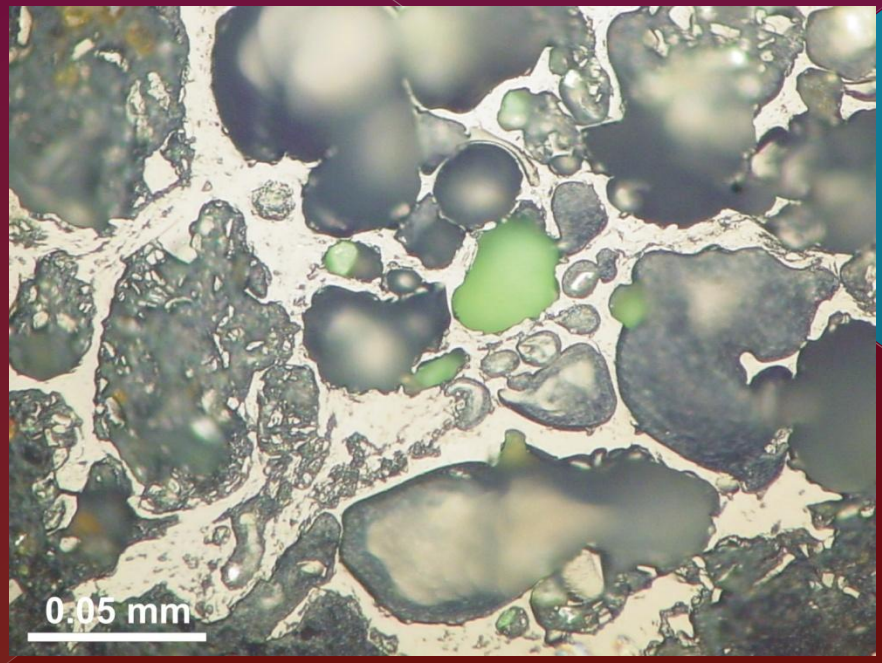


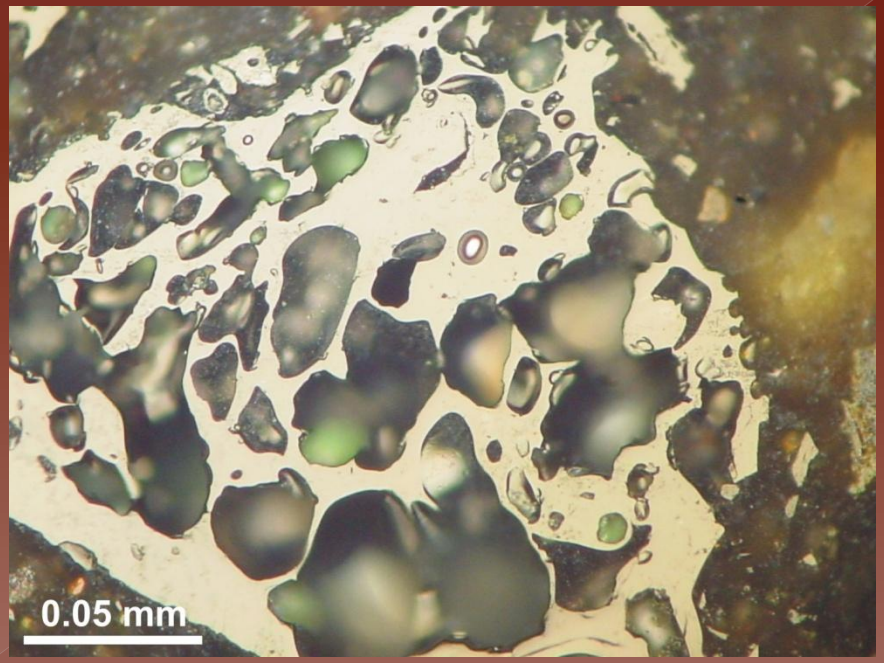
Pyrolytic carbon

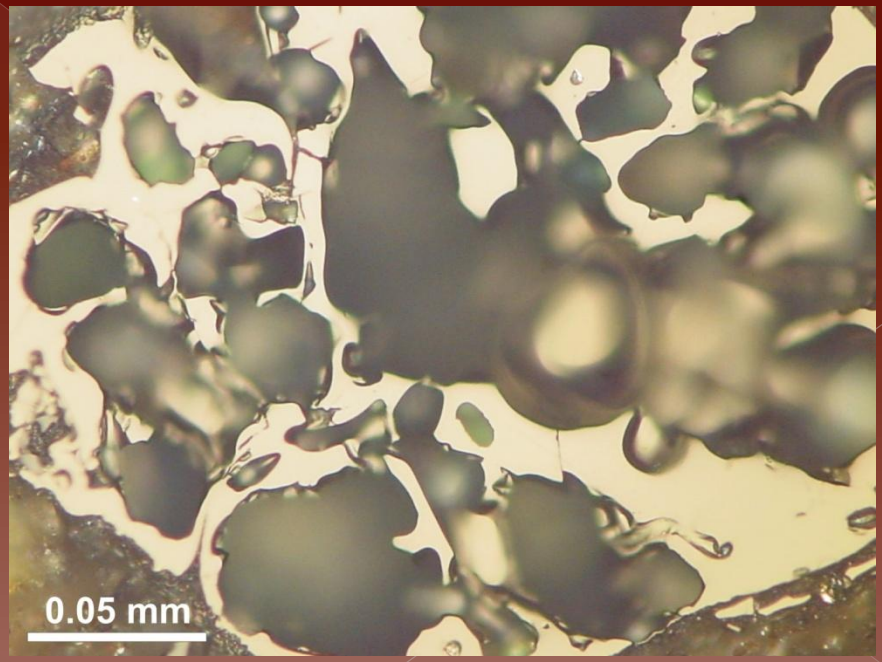




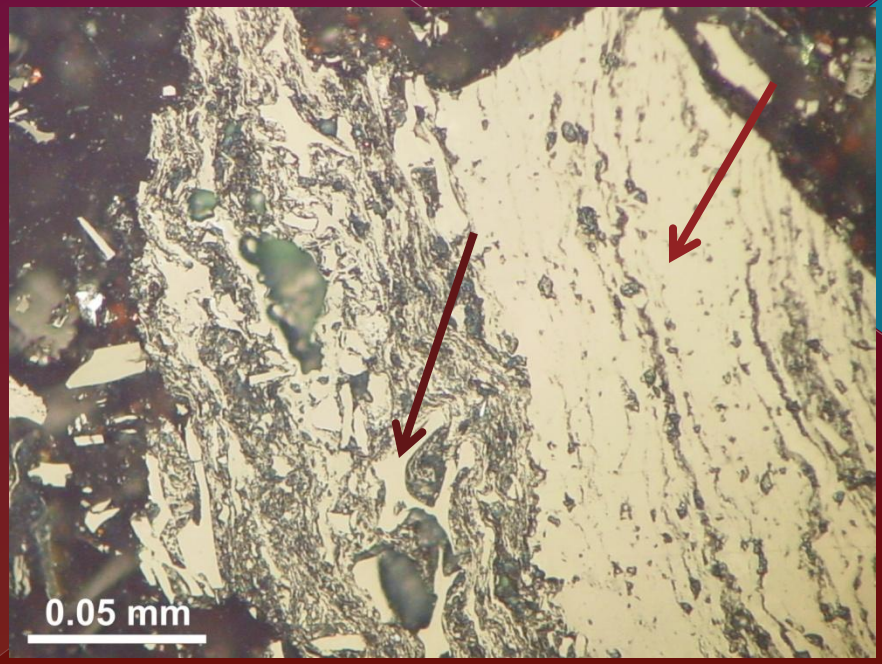
Porous coke

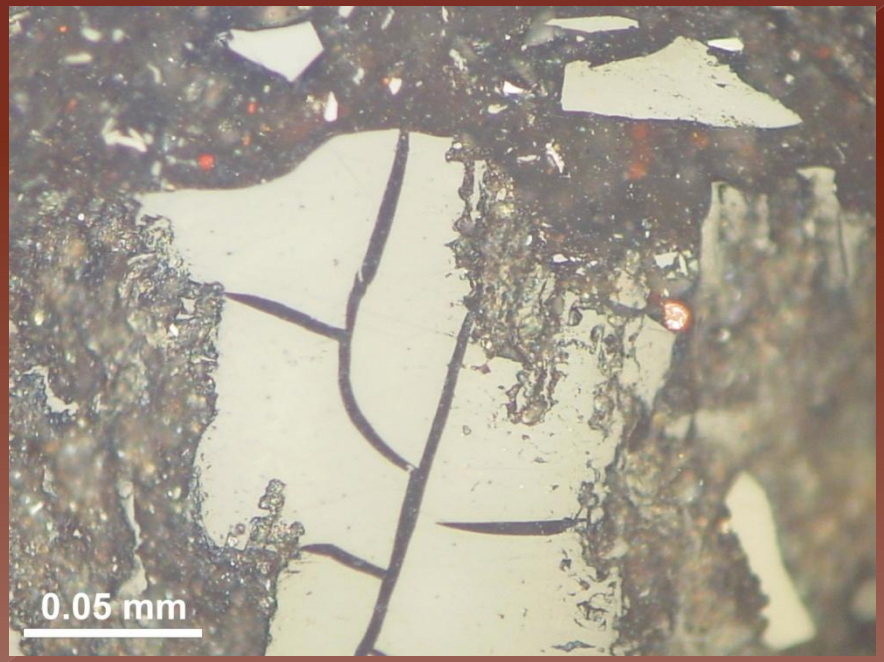


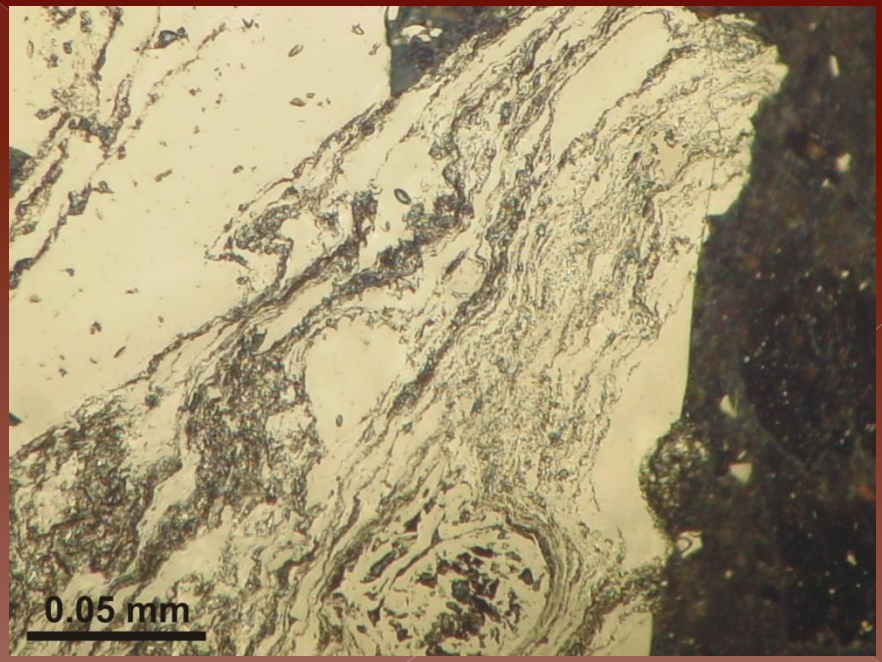




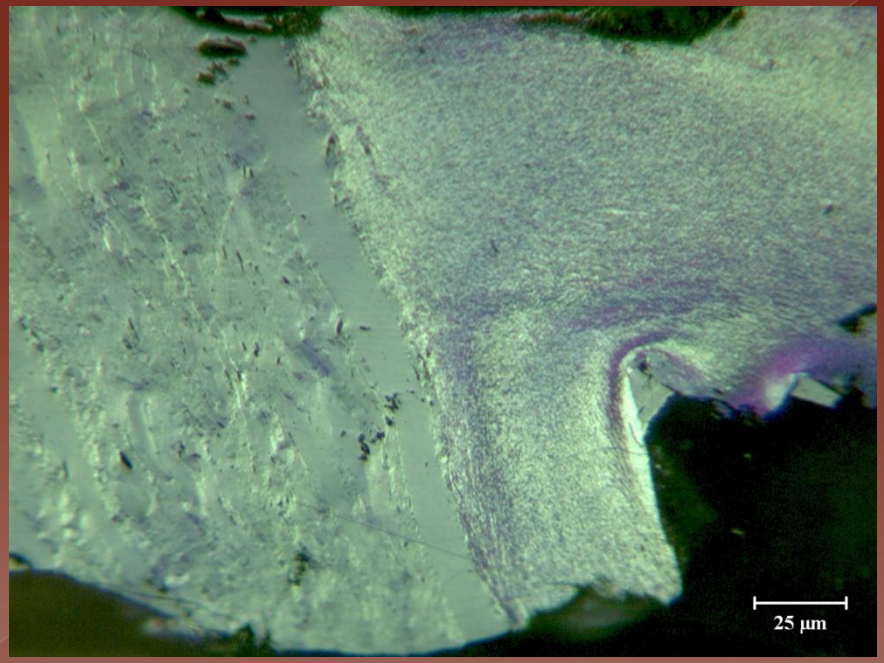
Massive isotropic coke

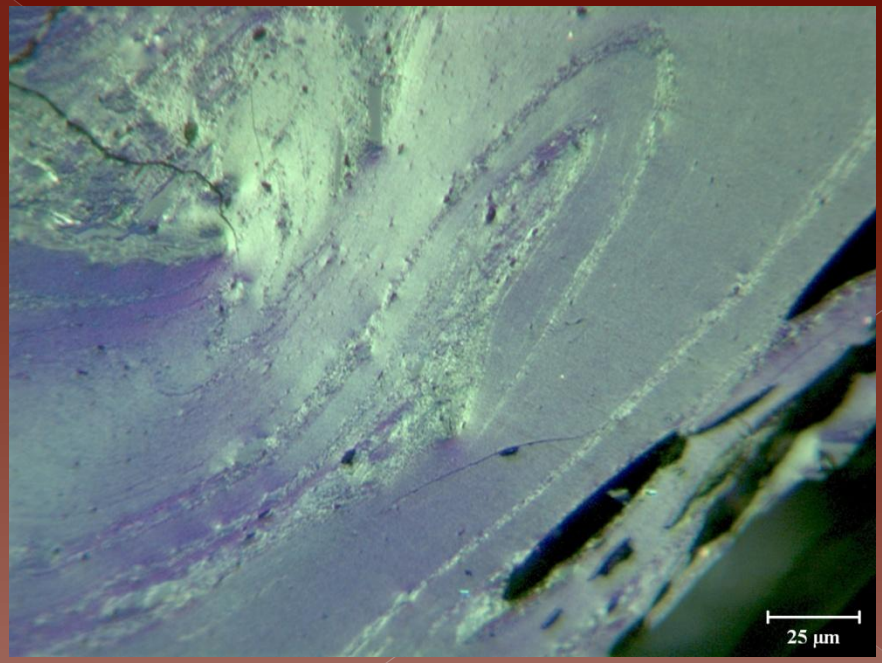




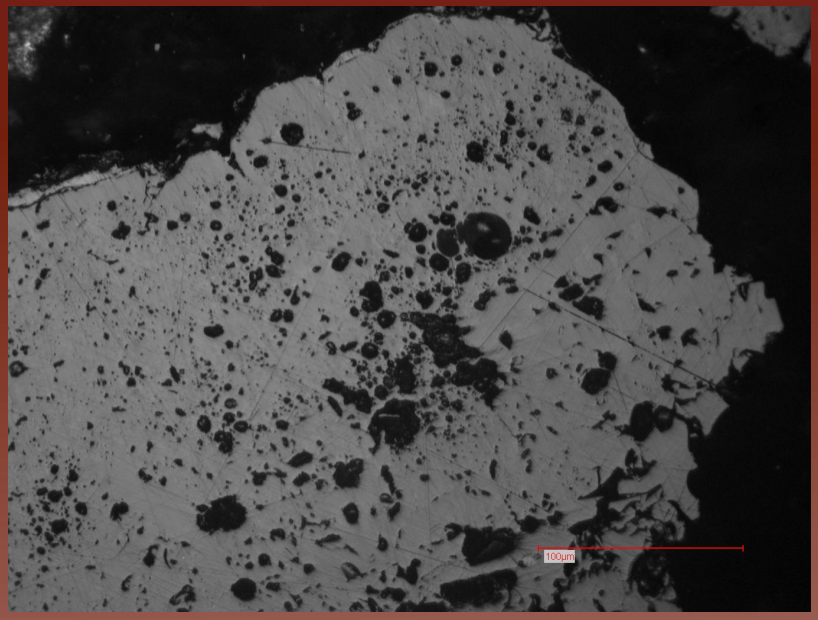


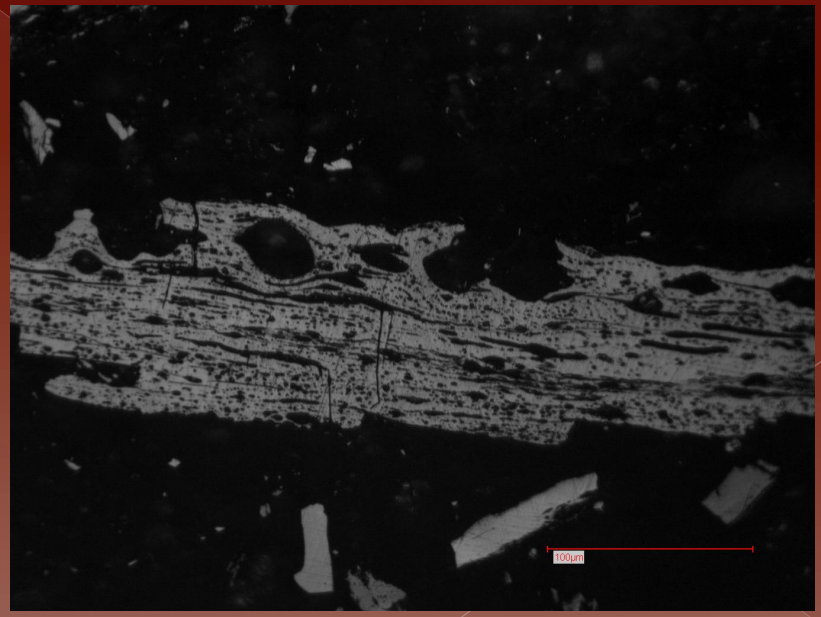
Massive anisotropic coke



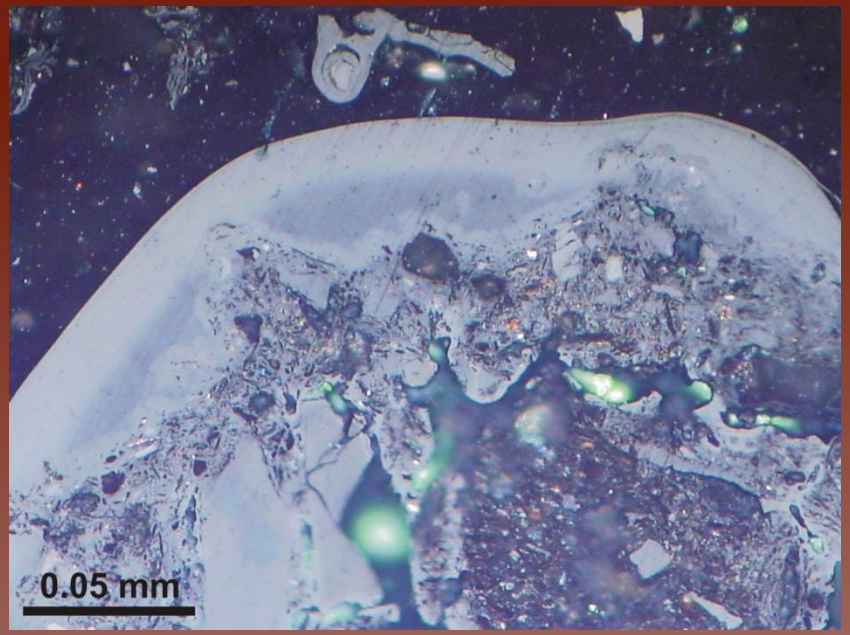


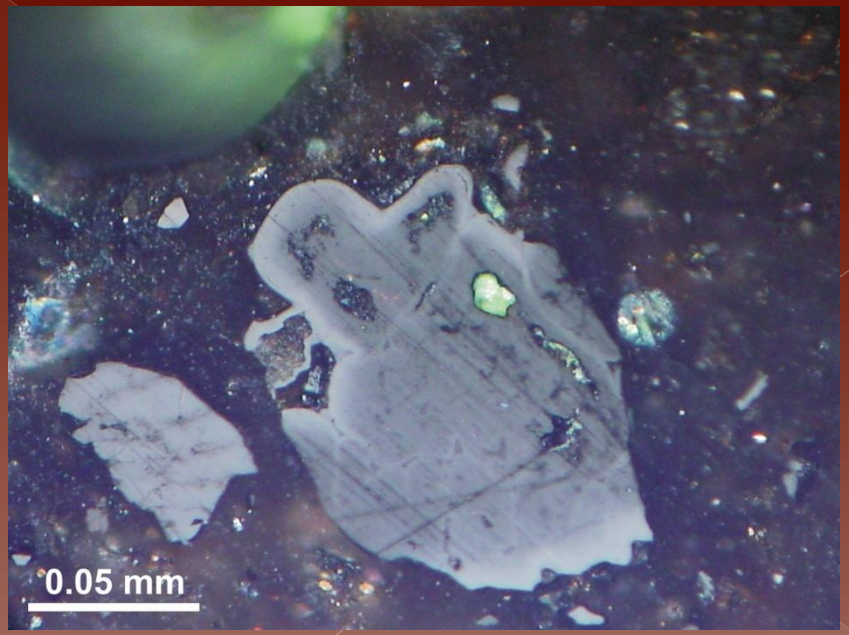
Particles with porosity



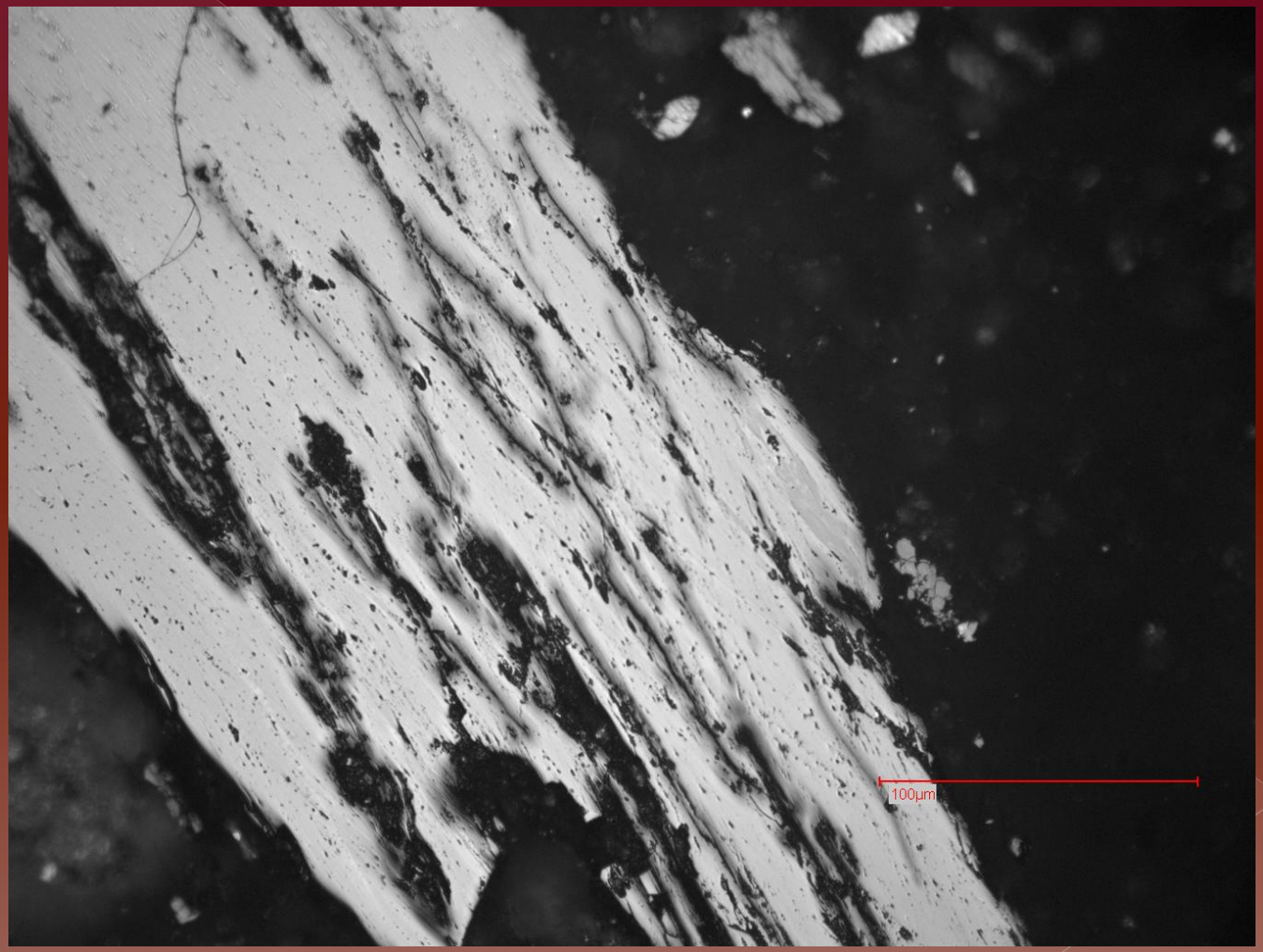


Plasticised edge and oxidation rim

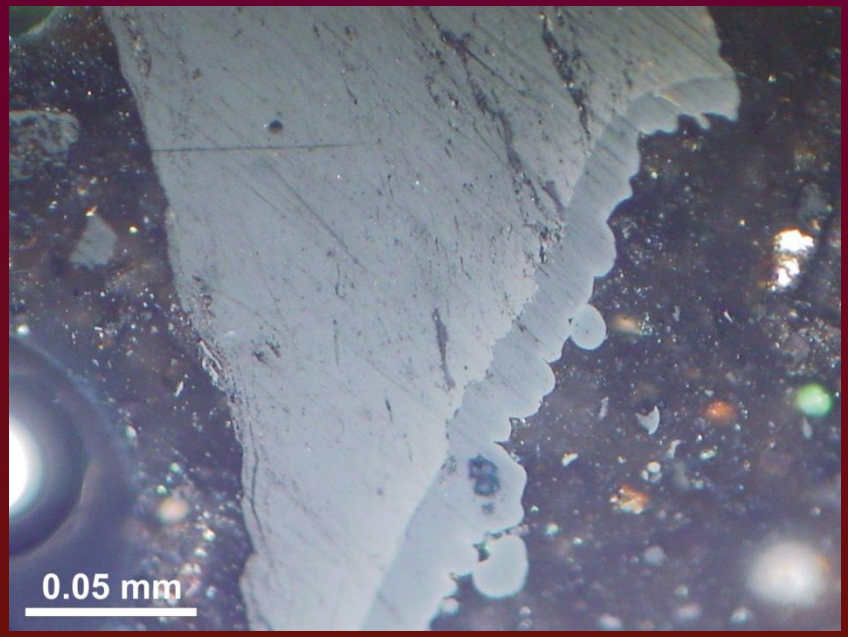


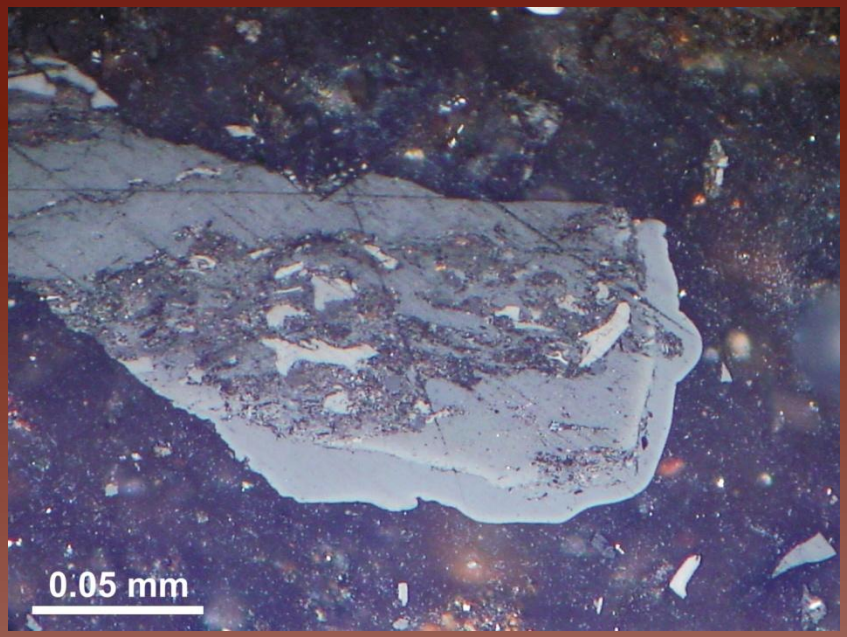


Cracks with oxidation rims

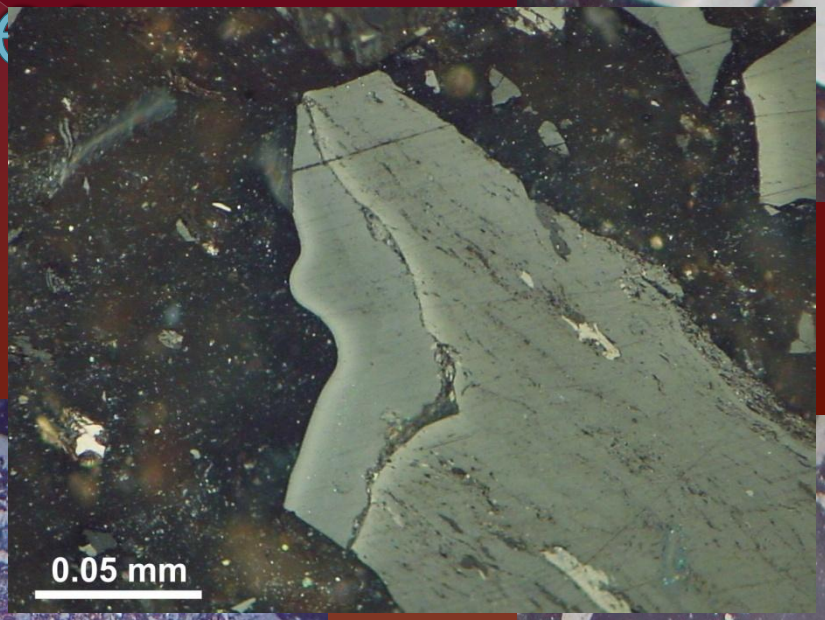


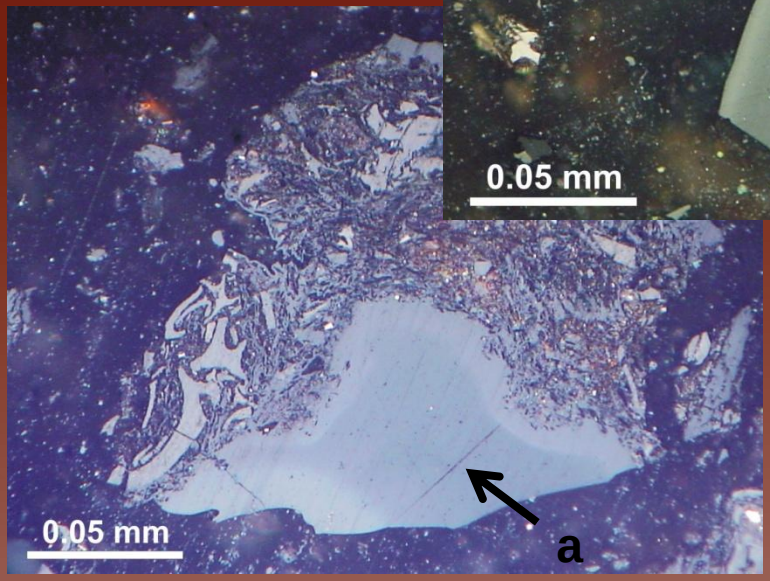
Bands

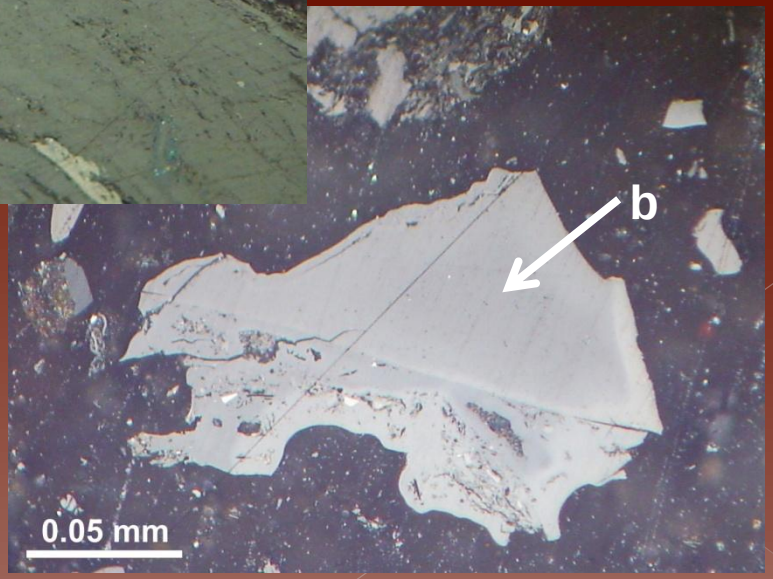




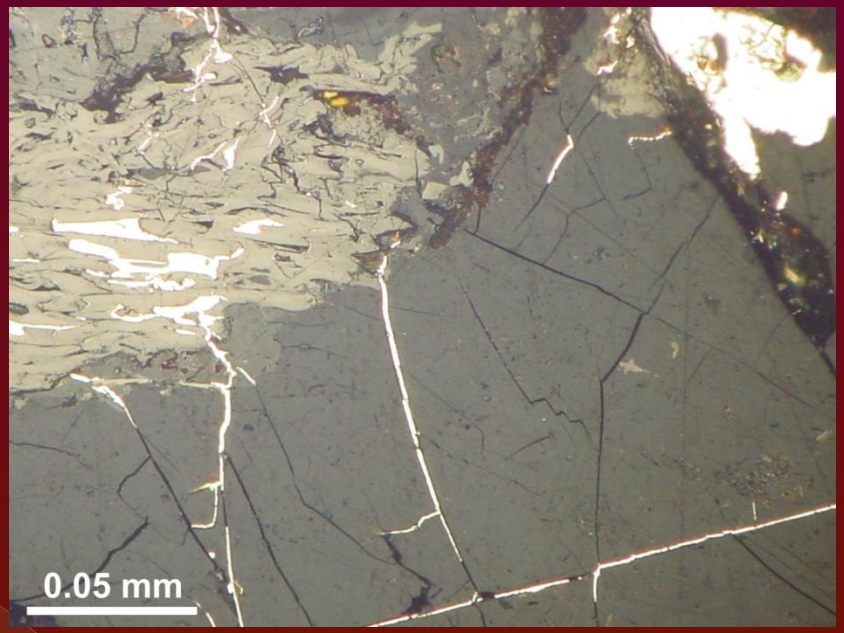
Paler in colour particle

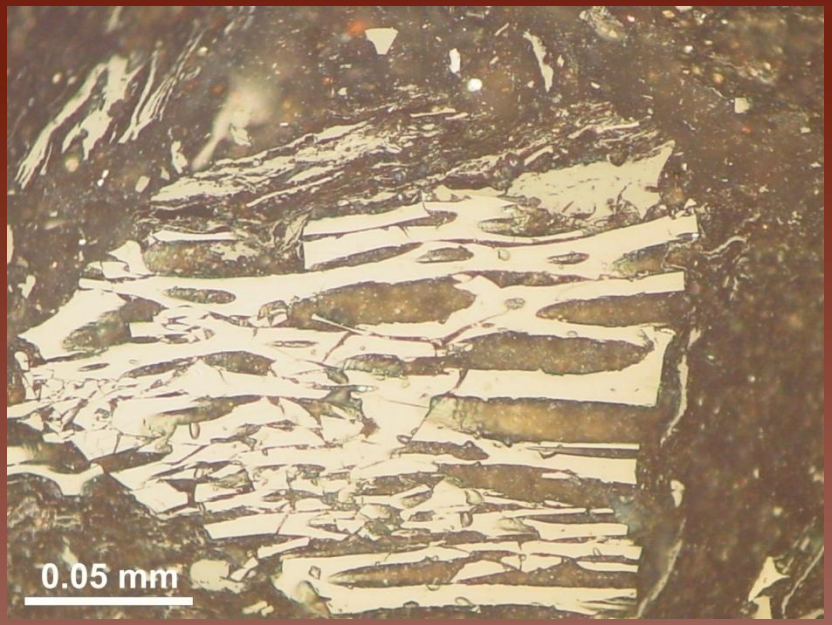


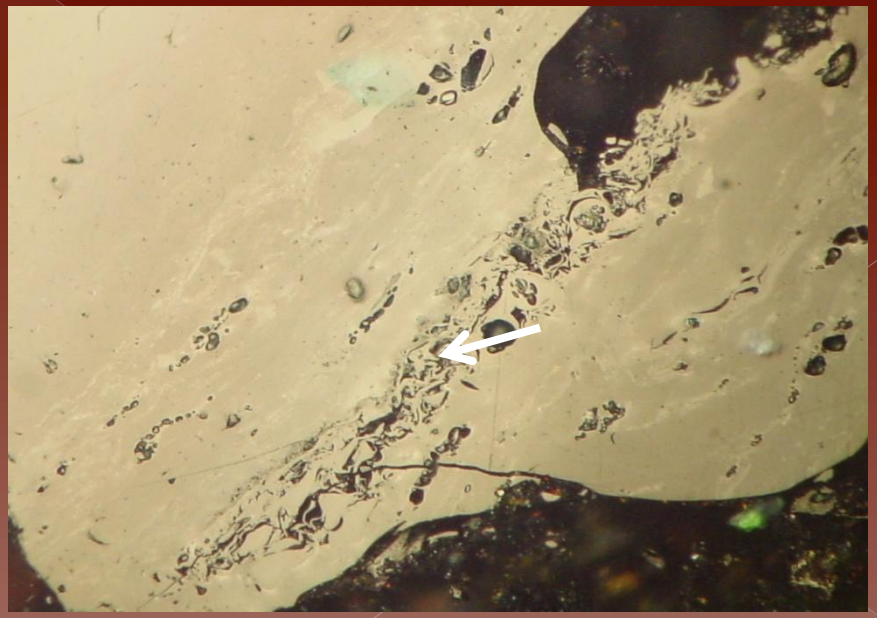




Inertinite





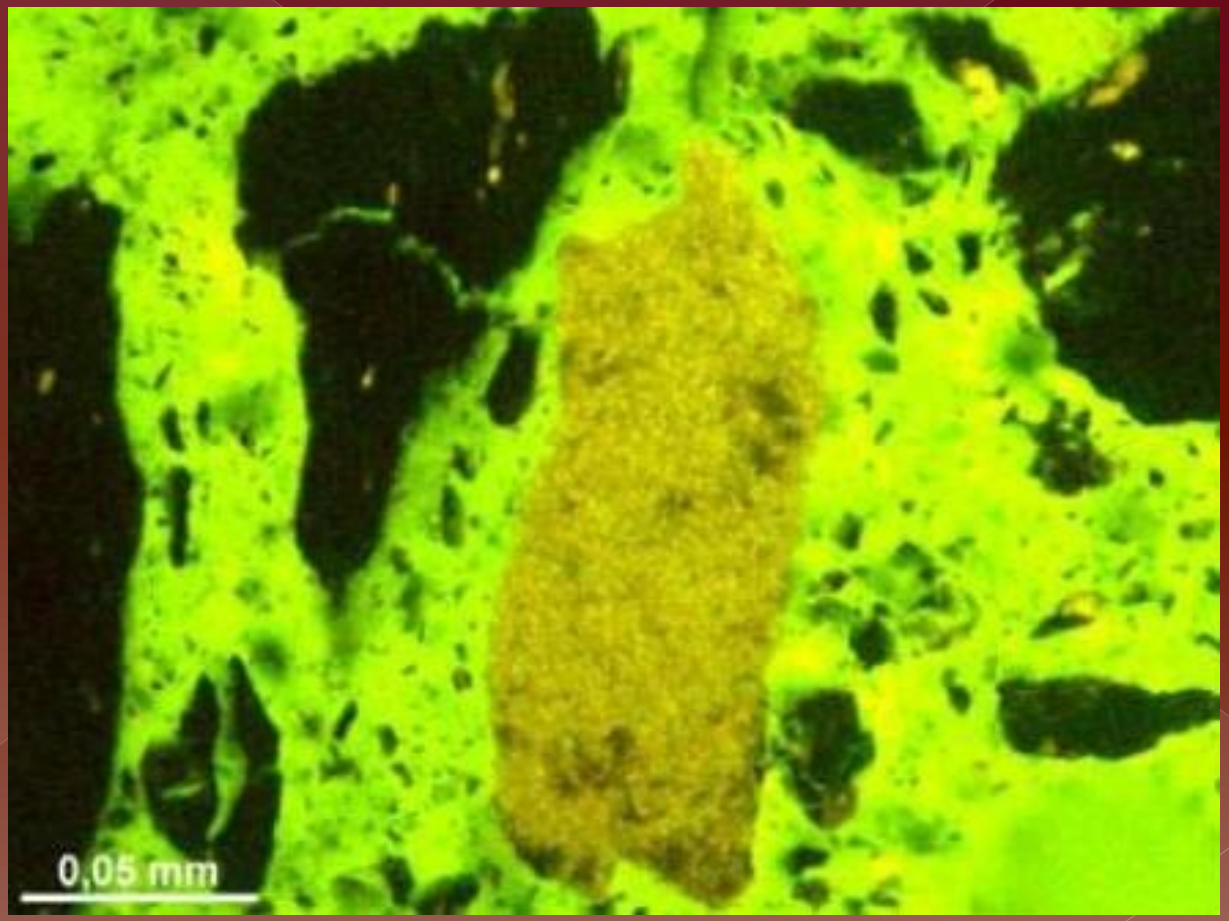


Suggestions for near future exercise from participants:

- To split the microfissure and crack category into two categories. To divide the microfissure category into fissures within a particle and fissures confined to the edges.
- To distinguish isotropic and anisotropic porous coke.
- To include a new class containing particles with pores
  - generated by devolatilization
  - natural pores belonging to the original structure.
- To extend the classification of bands, paler in colour particles and unaltered forms.

Other suggestions for future exercises:

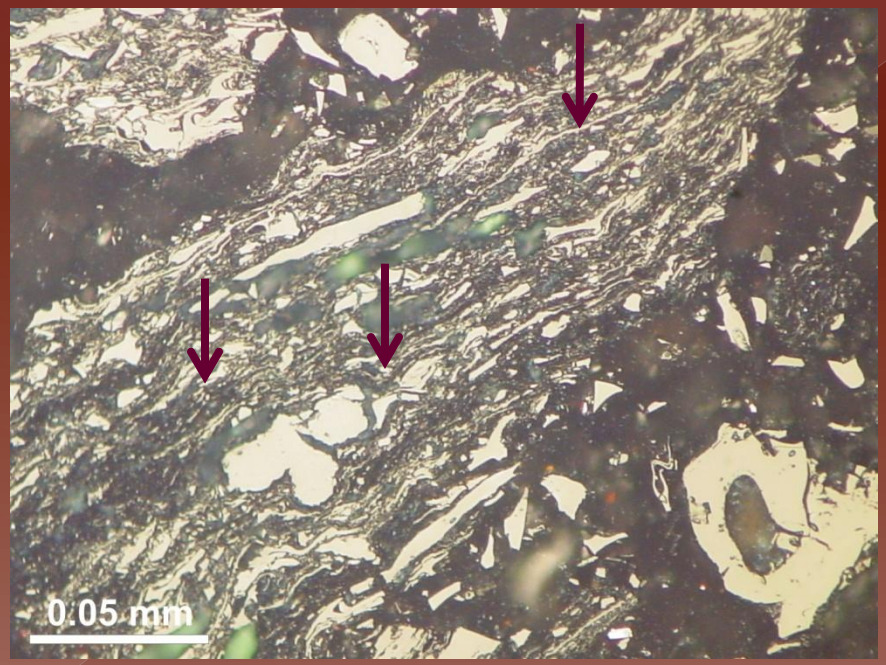
- Include generated hydrocarbons

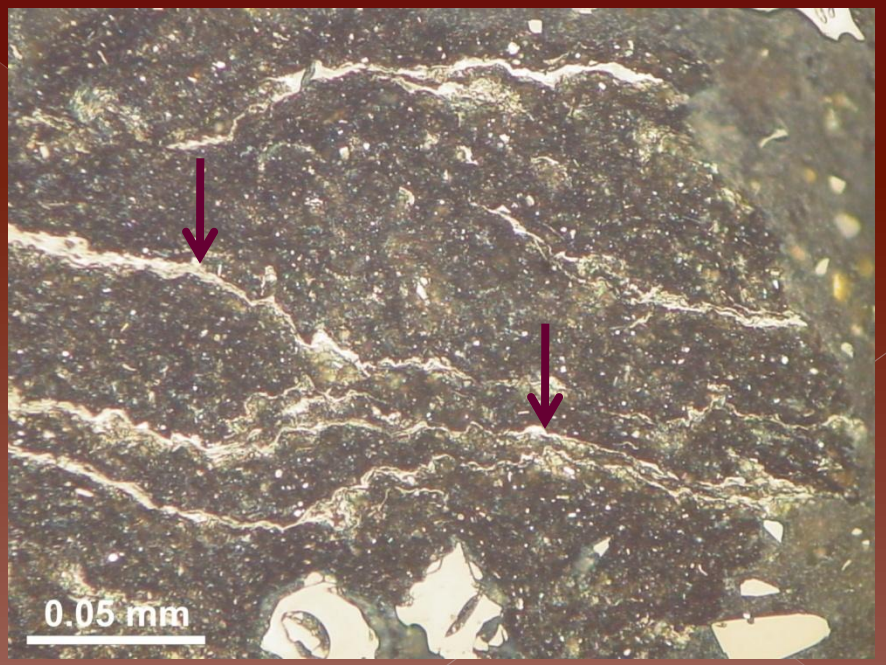


Misz M., Fabiańska M., Ćmiel S., 2007. International Journal of Coal Geology, 71, 4, 405-424

Other suggestions for future exercises:

- To extend our classification of coked vitrinite occurring as dispersed organic matter (in forms of detritus, laminae, thin lenses etc.)





Other suggestions for future exercises:

- Divide our classification into coals and coal wastes
- Distinguish a separate category for, e.g. cracks with oxidation rims, plasticised edges with oxidation rims

The schedule for next exercise:

- the end of March 2010 – the deadline for sending microphotographs of organic matter altered in self-heating processes
- the end of June 2010 – preparation of next exercise
- August 31, 2010 – the deadline for sending results.