sustainability

Contaminants in the Soil and Typical Crops of the Pannonian Region of Slovenia

Žiga Jelen [1,2], Milan Svetec [1], Peter Majerič [2,3], Stanislav Kapun [4], Lara Resman [4], Tatjana Čeh [4], Granit Hajra [2,5] and Rebeka Rudolf [1,2,3,*]

[1] Pomurje Science and Innovation Centre, 9000 Murska Sobota, Slovenia; ziga.jelen@zis.si (Ž.J.); milan.svetec@zis.ms (M.S.)
[2] Faculty of Mechanical Engineering, University of Maribor, 2000 Maribor, Slovenia; peter.majeric@um.si (P.M.), granit.hajra@student.um.si (G.H.)
[3] Zlatarna Celje d.o.o., 3000 Celje, Slovenia
[4] Chamber of Agriculture and Forestry, Slovenia Institute of Agriculture and Forestry, Murska Sobota, Štefana Kovača 40, 9000 Murska Sobota, Slovenia; stanko.kapun@kgzs-ms.si (S.K.); lara.resman@kgzs-ms.si (L.R.); tatjana.ceh@kgzs-ms.si (T.Č.)
[5] Department of Manufacturing Machinery, Faculty of Mechanical and Computer Engineering, University of Mitrovica, 40000 Mitrovica, Kosovo
* Correspondence: rebeka.rudolf@um.si

Supplementary Material S1

Contents:

Figure 1. Stitched FTIR microscopy images of residues taken from the **G. Radgona** soil sample.....4
Figure 2. Detailed view and FTIR spectrum of point 1 (**G. Radgona** image B) – The spectrum corresponds to poly p-phenylene ether sulphone (Filter paper substrate).....4
Figure 3. Detailed view and FTIR spectrum of point 2 (**G. Radgona** image B) - The spectrum corresponds to poly p-phenylene ether sulphone (Filter paper substrate).....4
Figure 4. Detailed view and FTIR spectrum of point 3 (**G. Radgona** image B) - The spectrum corresponds to **natural cotton** (Textile residue).....5
Figure 5. Stitched FTIR microscopy images of residues taken from the **Murska Sobota** soil sample.....5
Figure 6. Detailed view and FTIR spectrum of point 1 (**Murska Sobota** image A) – The spectrum corresponds to vinyl chloride contaminated material (Possibly UV degraded PVC). 5
Figure 7. Detailed view and FTIR spectrum of point 2 (**Murska Sobota** image A) – The spectrum corresponds to PTFE (Most likely residue from the magnetic stir bar) 6
Figure 8. Detailed view and FTIR spectrum of point 3 (**Murska Sobota** image A) – The spectrum corresponds to HD-PE 6
Figure 9. Detailed view and FTIR spectrum of point 4 (**Murska Sobota** image A) – The spectrum corresponds to a typical spectrum for Spandex fibers.....6
Figure 10. Detailed view and FTIR spectrum of point 5 (**Murska Sobota** image A) – The spectrum corresponds to PE 6
Figure 11. Detailed view and FTIR spectrum of point 6 (**Murska Sobota** image A) – The spectrum corresponds to poly phenylene ether sulphone (Filter paper substrate).....7
Figure 12. Detailed view and FTIR spectrum of point 7 (**Murska Sobota** image A) – The spectrum corresponds to vinyl chloride contaminated material (Possibly UV degraded PVC). 7
Figure 13. Detailed view and FTIR spectrum of point 8 (**Murska Sobota** image A) – The spectrum corresponds to poly ester urethane. 7
Figure 14. Detailed view and FTIR spectrum of point 9 (**Murska Sobota** image B) – The spectrum corresponds to HD-PE 8
Figure 15. Detailed view and FTIR spectrum of point 10 (**Murska Sobota** image B) – The spectrum corresponds to poly phenylene ether sulphone (Filter paper substrate).....8
Figure 16. Detailed view and FTIR spectrum of point 11 (**Murska Sobota** image B) – The spectrum corresponds PE 8
Figure 17. Stitched FTIR microscopy images of residues taken from the **Mljatinci** soil sample.....9
Figure 18. Detailed view and FTIR spectrum of point 1 (**Mljatinci** image A) – The spectrum corresponds to poly p-phenylene ether sulphone (Filter paper substrate).....9

Figure 19. Detailed view and FTIR spectrum of point 2 (**Mljatinci** image A) – The spectrum corresponds to poly p-phenylene ether sulphone (Filter paper substrate).....9
Figure 20. Stitched FTIR microscopy images of residues taken from the **Rakičan** soil sample.....10
Figure 21. Detailed view and FTIR spectrum of point 1 (**Rakičan** image B) – The spectrum corresponds to poly p-phenylene ether sulphone (Filter paper substrate).....10
Figure 22. Detailed view and FTIR spectrum of point 2 (**Rakičan** image B) – A clear spectrum could not be captured – Most likely can be attributed to natural cotton. 10
Figure 23. Stitched FTIR microscopy images of residues taken from the **S. Cesta** soil sample 11
Figure 24. Detailed view and FTIR spectrum of point 1 (**S. Cesta** image A) – The spectrum corresponds to PE 11
Figure 25. Detailed view and FTIR spectrum of point 2 (**S. Cesta** image A) – The spectrum corresponds to Cellulose (Most likely from textile).....11
Figure 26. Detailed view and FTIR spectrum of point 3 (**S. Cesta** image B) – The spectrum corresponds to poly p-phenylene ether sulphone (Filter paper substrate).....12
Figure 27. Detailed view and FTIR spectrum of point 4 (**S. Cesta** image B) – The spectrum corresponds to p-phenylene ether sulphone (Filter paper substrate).....12
Figure 28. Stitched FTIR microscopy images of residues taken from the **Selo** soil sample 12
Figure 29. Detailed view and FTIR spectrum of point 1 (**Selo** image A) – The spectrum corresponds to poly ester urethane.....13
Figure 30. Detailed view and FTIR spectrum of point 2 (**Selo** image B) – The spectrum corresponds to poly ester urethane.....13
Figure 31. Stitched FTIR microscopy images of residues taken from the ⚜**bigovci** soil sample 14
Figure 32. Detailed view and FTIR spectrum of point 1 (⚜**bigovci** image A) – The spectrum corresponds to p-phenylene ether sulphone (Filter paper substrate).....14
Figure 33. Detailed view and FTIR spectrum of point 2 (⚜**bigovci** image B) – The spectrum corresponds to p-phenylene ether sulphone (Filter paper substrate).....14
Figure 34. Detailed view and FTIR spectrum of point 3 (⚜**bigovci** image B) – The spectrum sems to corresponds to Maize Starch (Possibly an oxidised residue) 15
Figure 35. Detailed view and FTIR spectrum of point 4 (⚜**bigovci** image B) – The spectrum corresponds to PE 15

1. G. Radgona

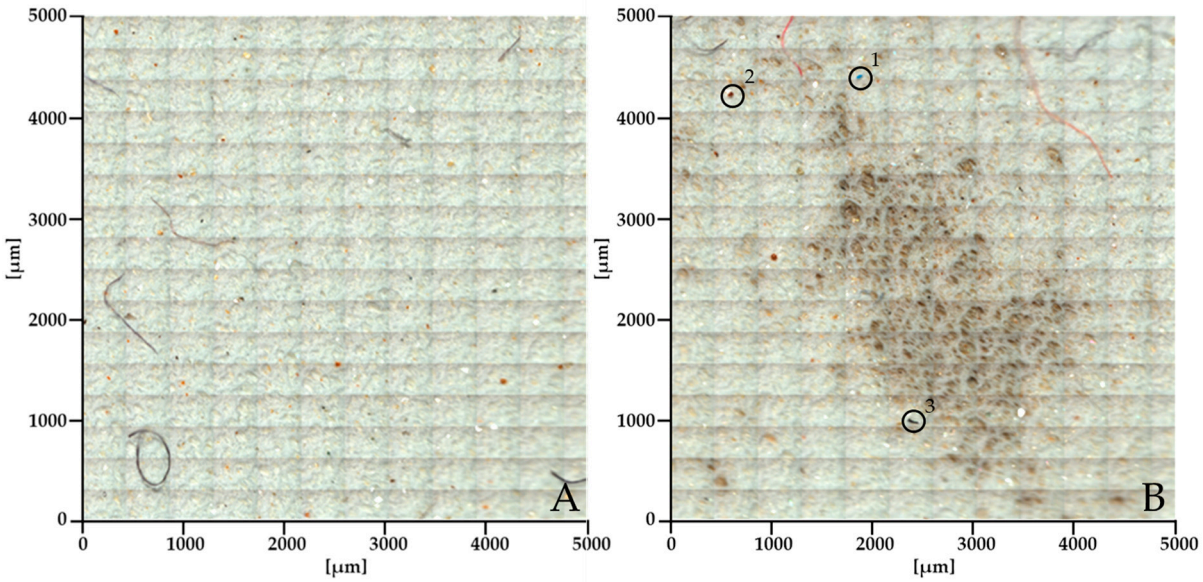


Figure 1. *Stitched FTIR microscopy images of residues taken from the* ***G. Radgona*** *soil sample*

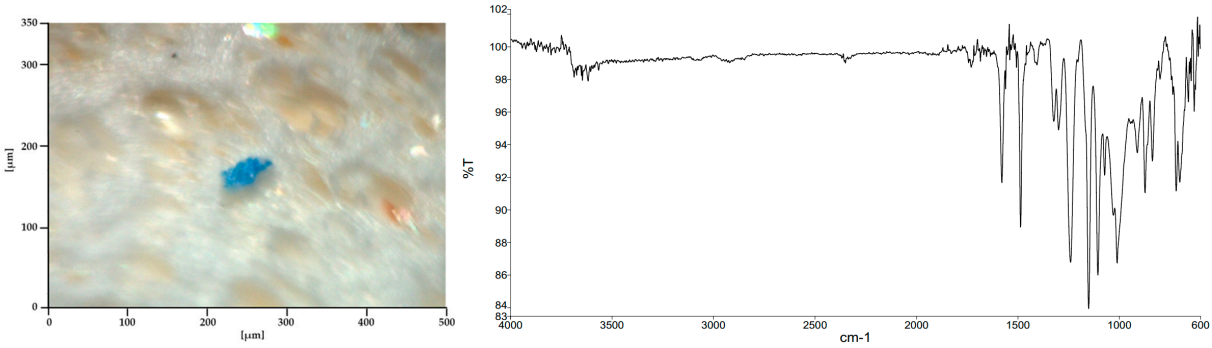


Figure 2. *Detailed view and FTIR spectrum of point 1 (****G. Radgona*** *image B) – The spectrum corresponds to poly p-phenylene ether sulphone (Filter paper substrate)*

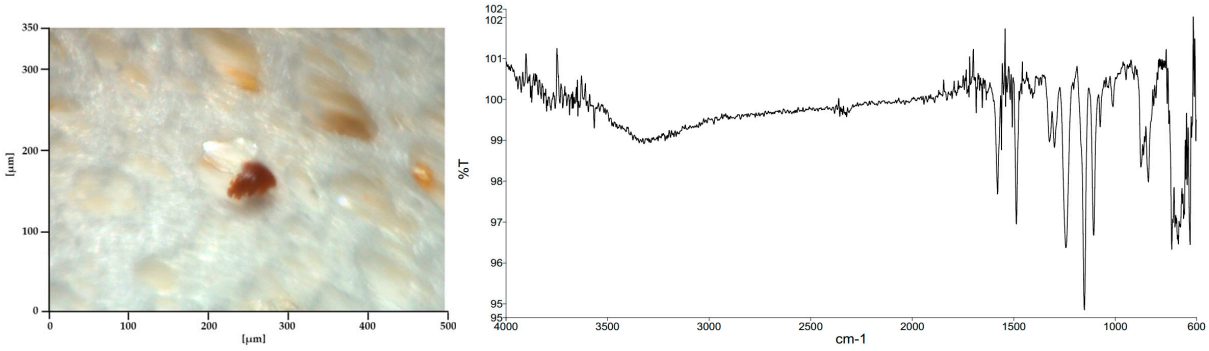


Figure 3. *Detailed view and FTIR spectrum of point 2 (****G. Radgona*** *image B) - The spectrum corresponds to poly p-phenylene ether sulphone (Filter paper substrate)*

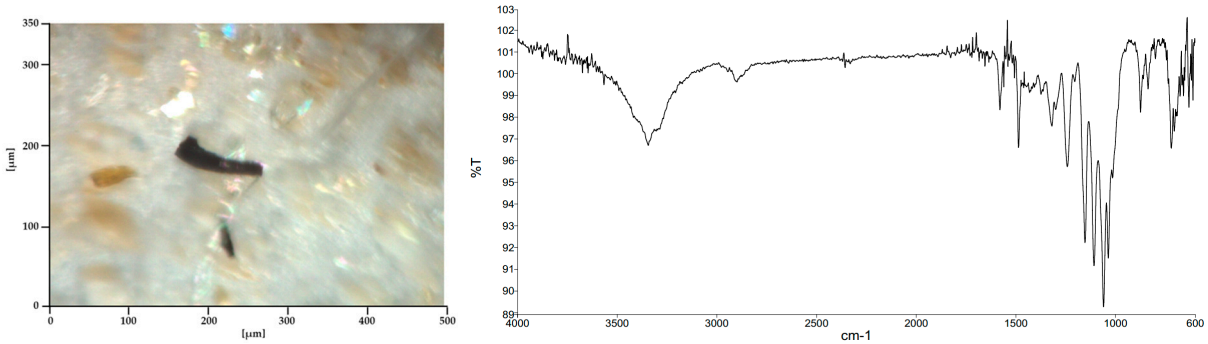


Figure 4. *Detailed view and FTIR spectrum of point 3 (**G. Radgona** image B) - The spectrum corresponds to **natural cotton** (Textile residue)*

2. Murska Sobota

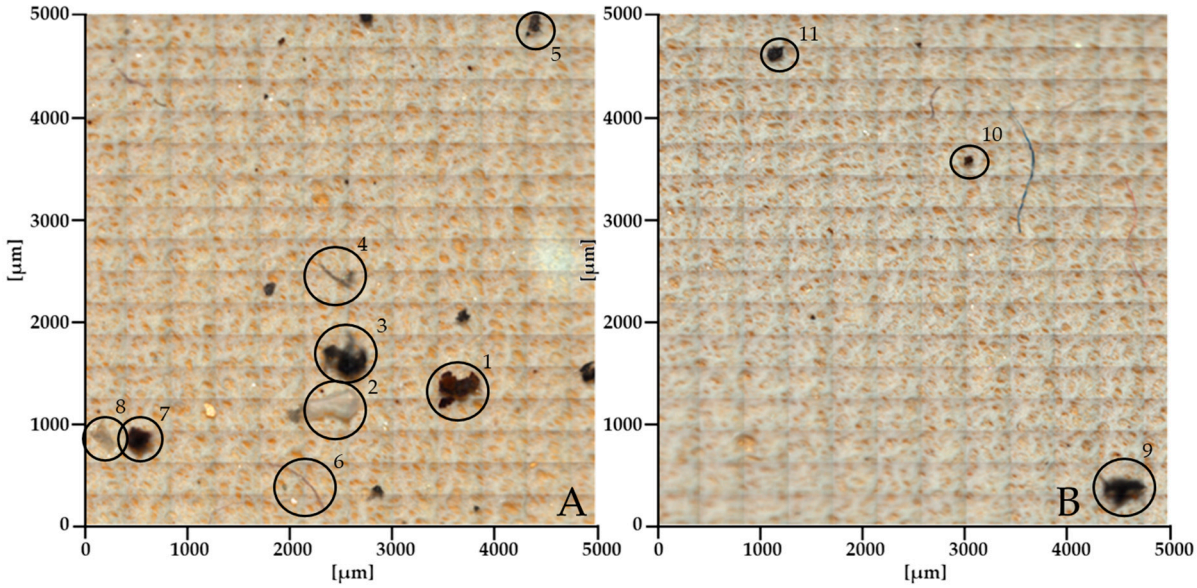


Figure 5. *Stitched FTIR microscopy images of residues taken from the **Murska Sobota** soil sample*

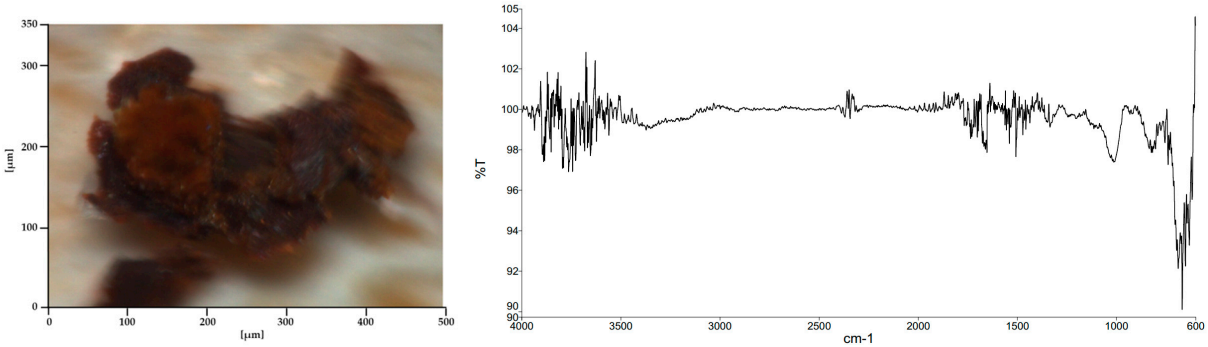


Figure 6. *Detailed view and FTIR spectrum of point 1 (**Murska Sobota** image A) – The spectrum corresponds to vinyl chloride contaminated material (Possibly UV degraded PVC).*

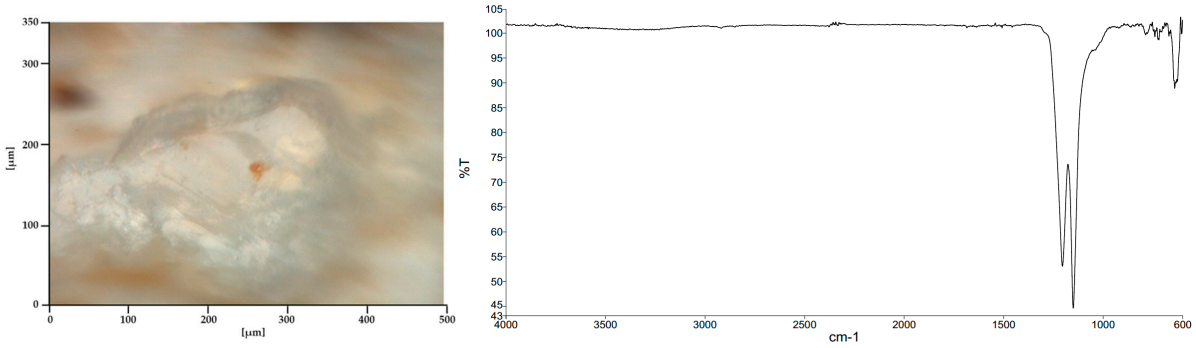


Figure 7. *Detailed view and FTIR spectrum of point 2 (**Murska Sobota** image A) – The spectrum corresponds to PTFE (Most likely residue from the magnetic stir bar)*

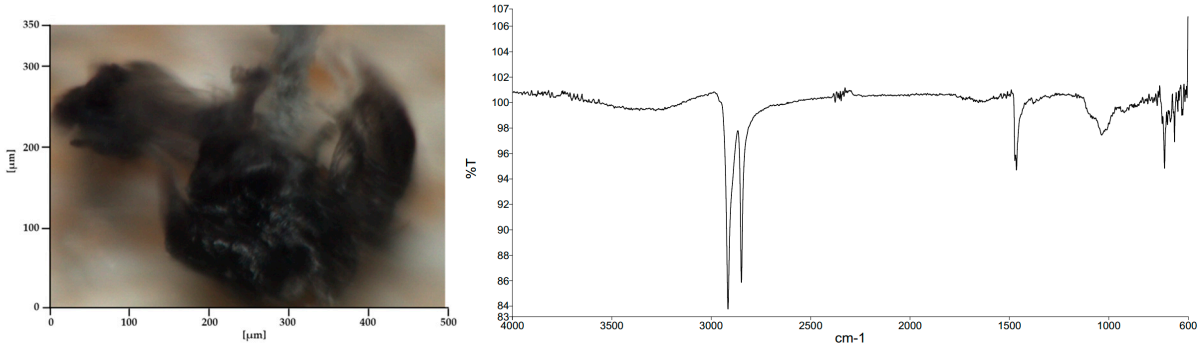


Figure 8*. Detailed view and FTIR spectrum of point 3 (**Murska Sobota** image A) – The spectrum corresponds to HD-PE*

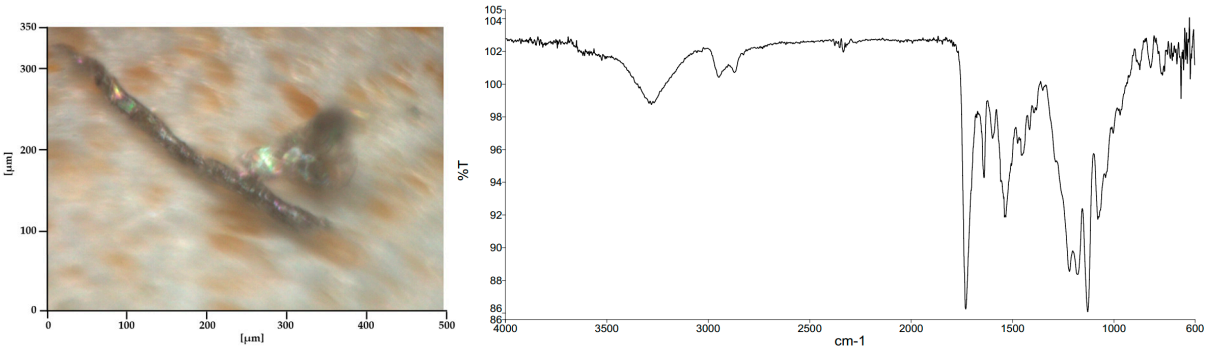


Figure 9. *Detailed view and FTIR spectrum of point 4 (**Murska Sobota** image A) – The spectrum corresponds to a typical spectrum for Spandex fibers*

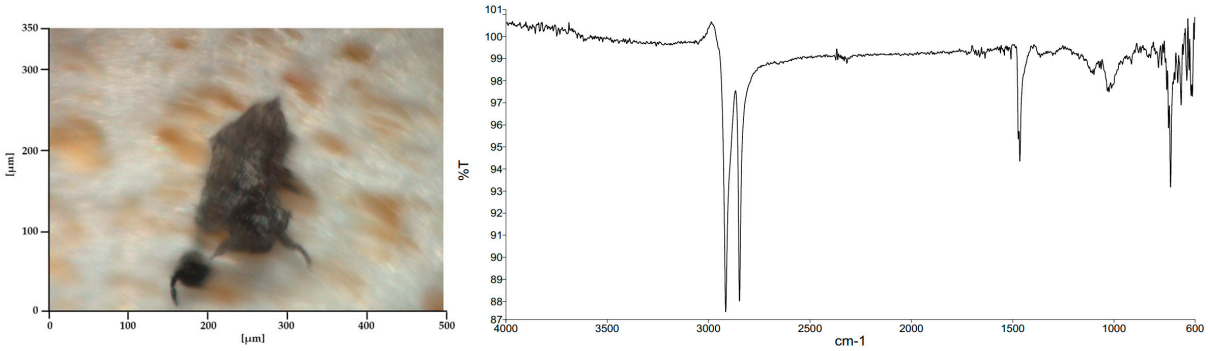


Figure 10. *Detailed view and FTIR spectrum of point 5 (**Murska Sobota** image A) – The spectrum corresponds to PE*

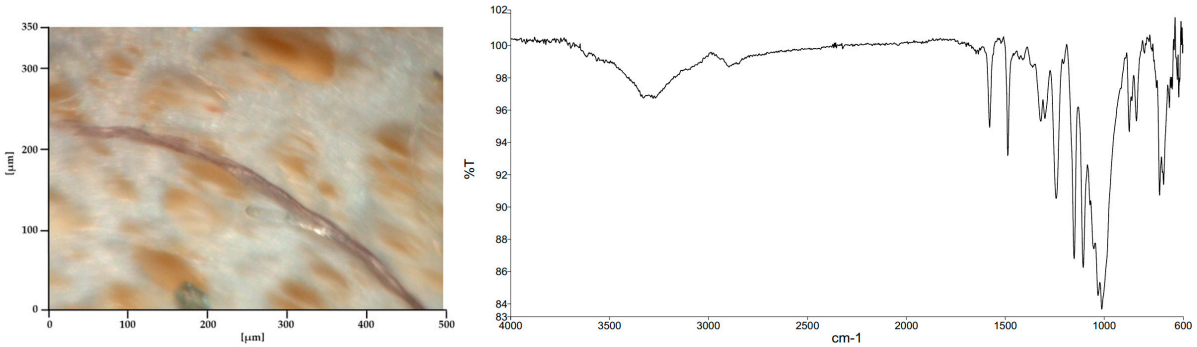


Figure 11. *Detailed view and FTIR spectrum of point 6 (**Murska Sobota** image A) – The spectrum corresponds to poly phenylene ether sulphone (Filter paper substrate)*

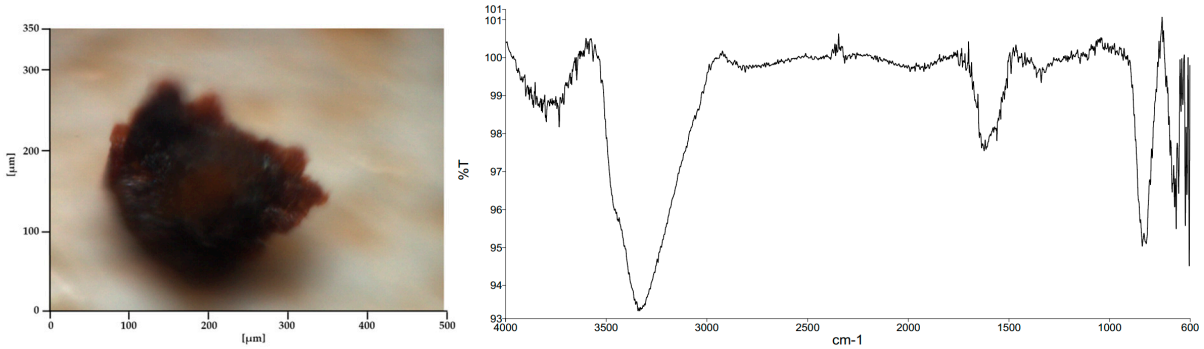


Figure 12. *Detailed view and FTIR spectrum of point 7 (**Murska Sobota** image A) – The spectrum corresponds to vinyl chloride contaminated material (Possibly UV degraded PVC).*

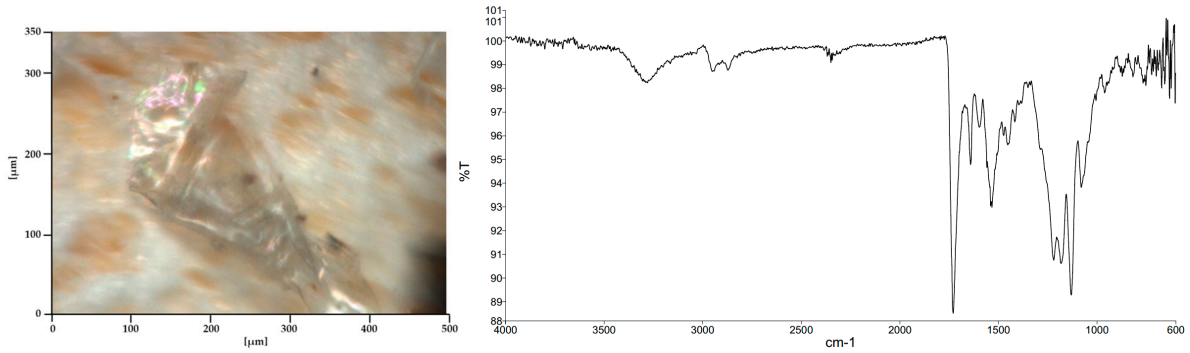


Figure 13. *Detailed view and FTIR spectrum of point 8 (**Murska Sobota** image A) – The spectrum corresponds to poly ester urethane.*

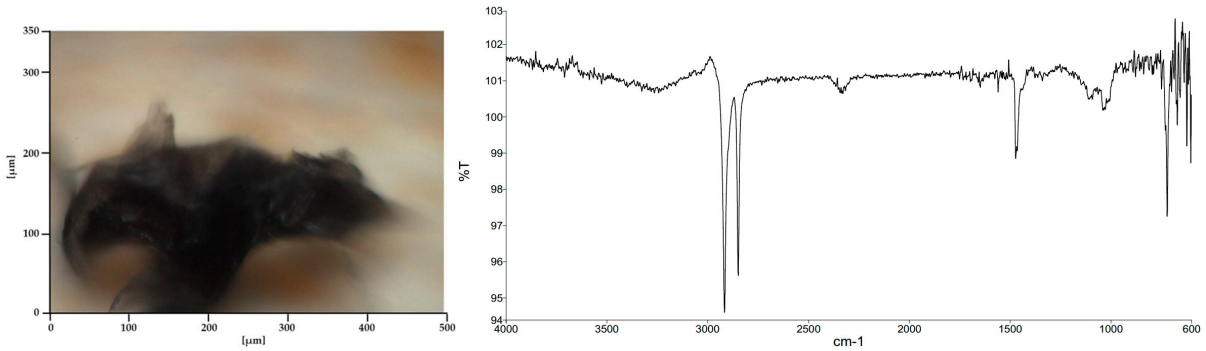


Figure 14. *Detailed view and FTIR spectrum of point 9 (**Murska Sobota** image B) – The spectrum corresponds to HD-PE*

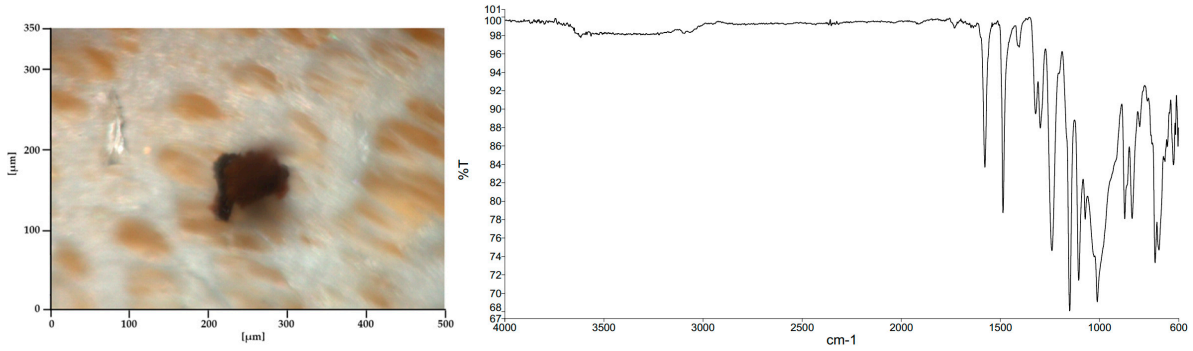


Figure 15. *Detailed view and FTIR spectrum of point 10 (**Murska Sobota** image B) – The spectrum corresponds to poly phenylene ether sulphone (Filter paper substrate)*

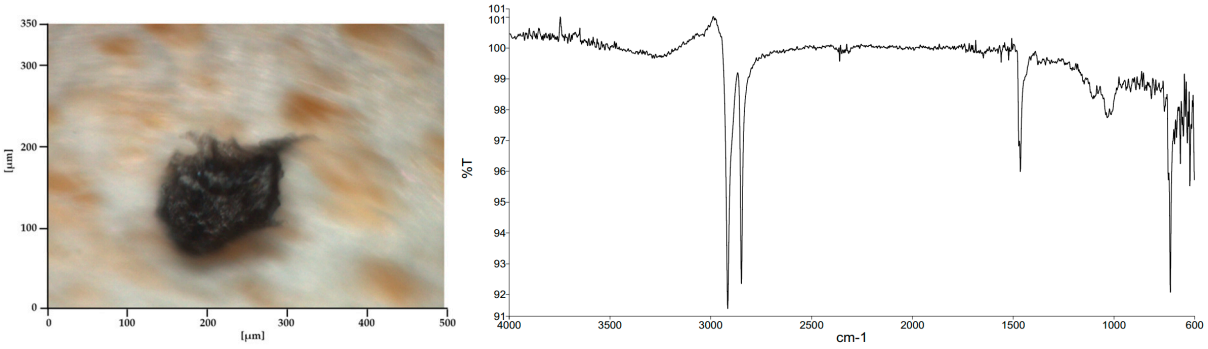


Figure 16. *Detailed view and FTIR spectrum of point 11 (**Murska Sobota** image B) – The spectrum corresponds PE*

3. Mljatinci

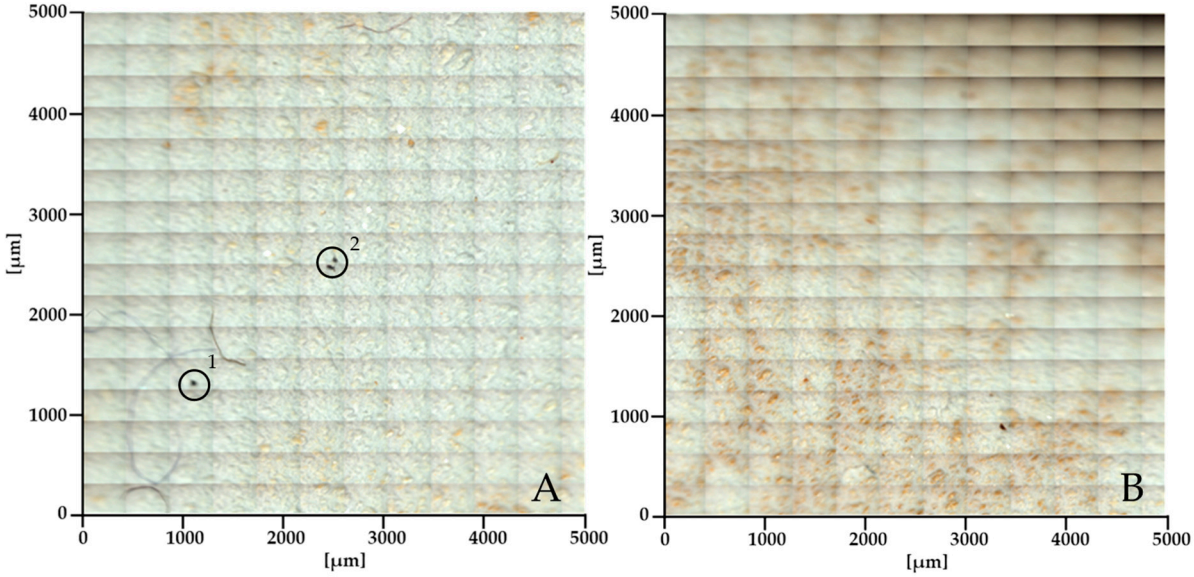


Figure 17. *Stitched FTIR microscopy images of residues taken from the* ***Mljatinci*** *soil sample*

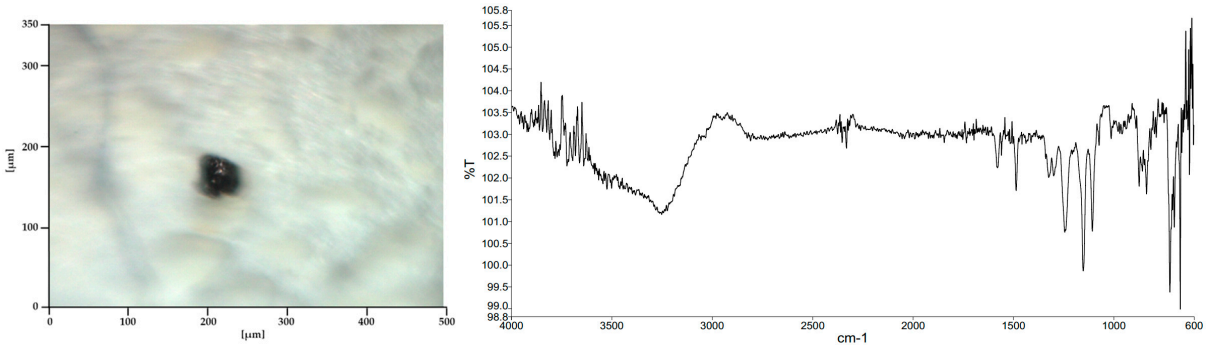


Figure 18. *Detailed view and FTIR spectrum of point 1 (****Mljatinci*** *image A) – The spectrum corresponds to poly p-phenylene ether sulphone (Filter paper substrate)*

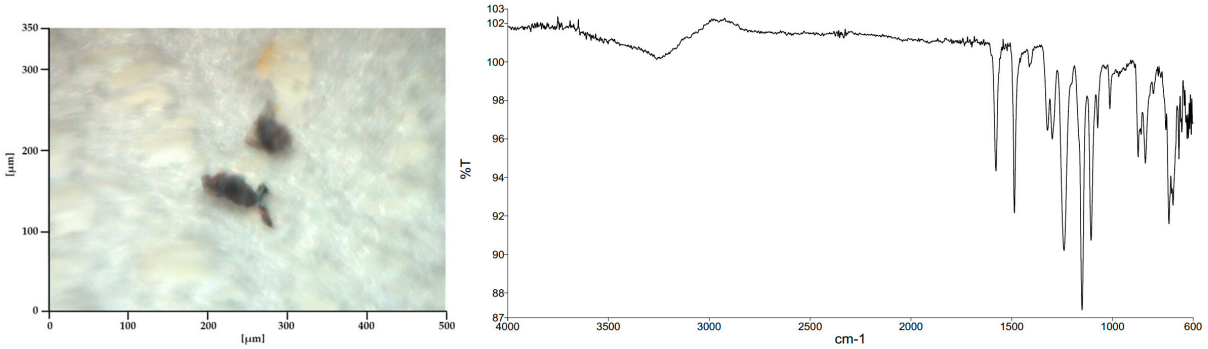


Figure 19. *Detailed view and FTIR spectrum of point 2 (****Mljatinci*** *image A) – The spectrum corresponds to poly p-phenylene ether sulphone (Filter paper substrate)*

4. Rakican

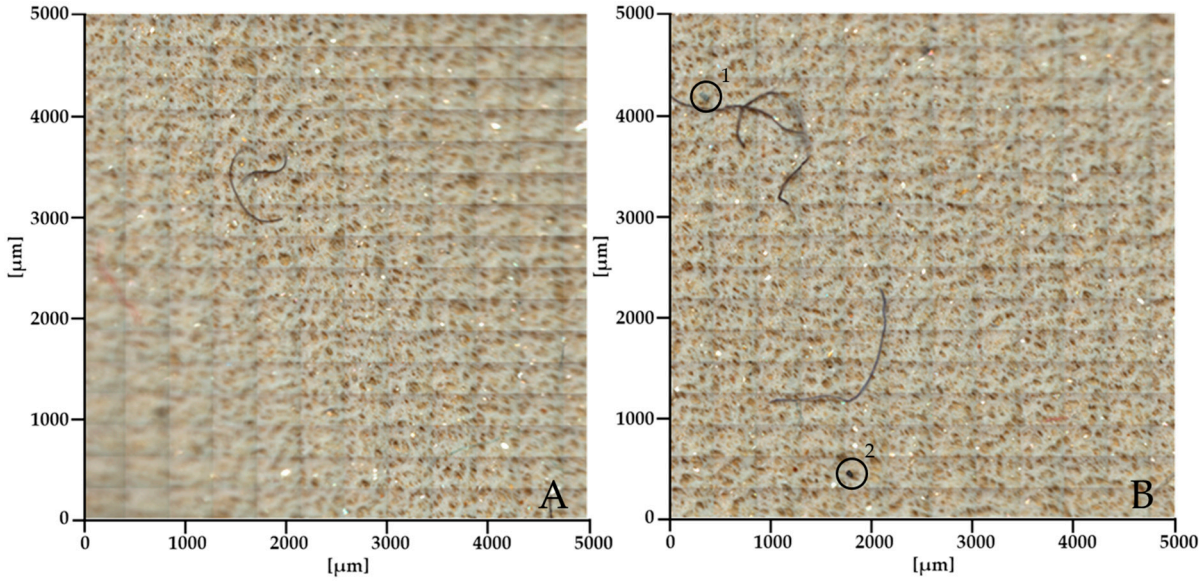


Figure 20. *Stitched FTIR microscopy images of residues taken from the* ***Rakičan*** *soil sample*

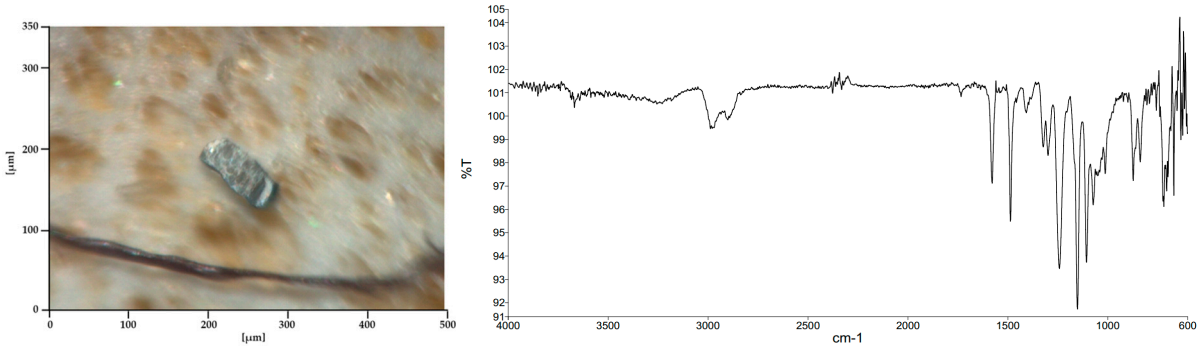


Figure 21. *Detailed view and FTIR spectrum of point 1 (****Rakičan*** *image B) – The spectrum corresponds to poly p-phenylene ether sulphone (Filter paper substrate)*

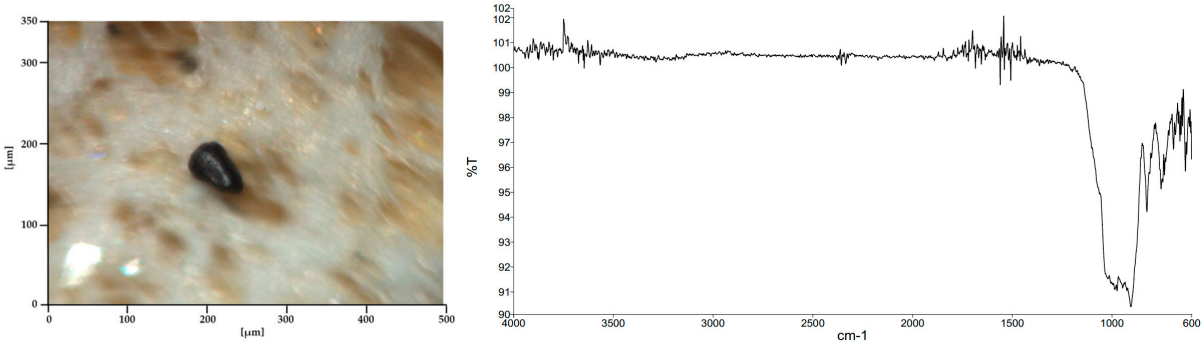


Figure 22. *Detailed view and FTIR spectrum of point 2 (****Rakičan*** *image B) – A clear spectrum could not be captured – Most likely can be attributed to natural cotton.*

5. S. Cesta

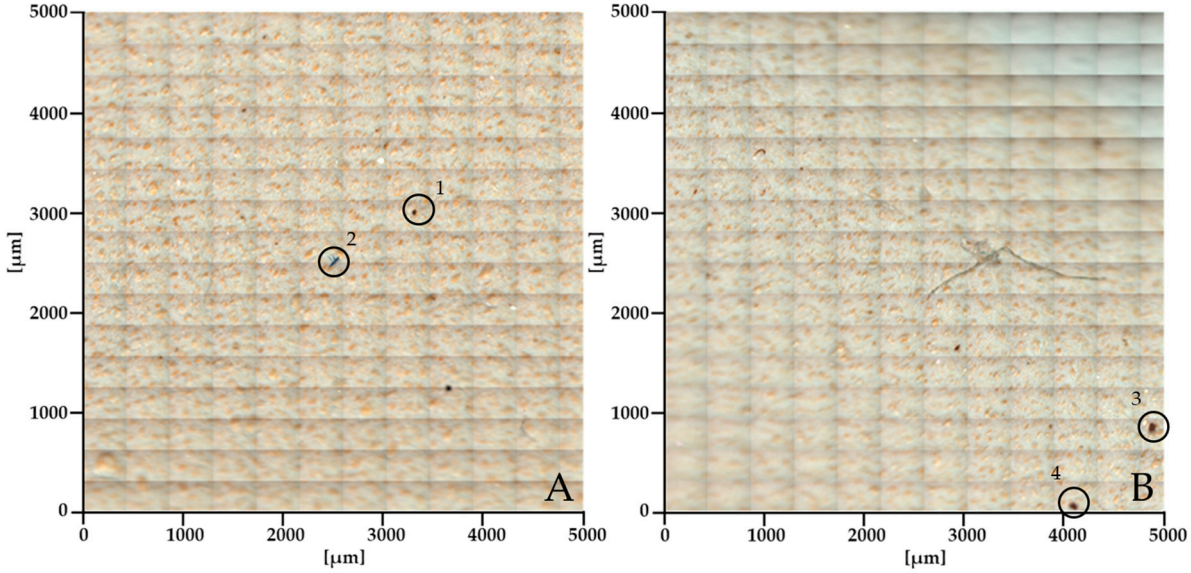


Figure 23. *Stitched FTIR microscopy images of residues taken from the* ***S. Cesta*** *soil sample*

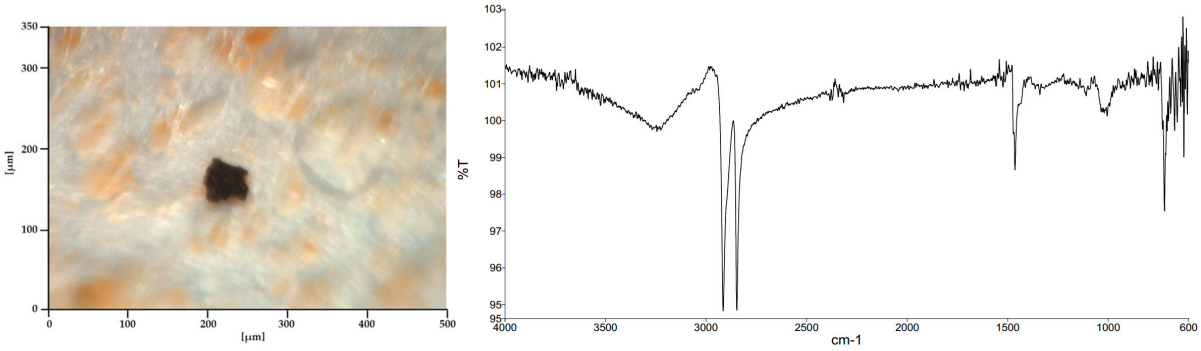


Figure 24. *Detailed view and FTIR spectrum of point 1 (****S. Cesta*** *image A) – The spectrum corresponds to PE*

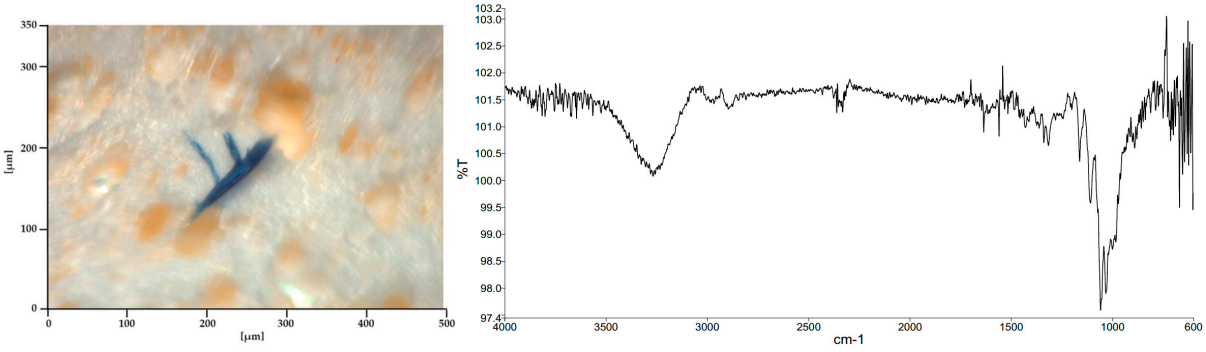


Figure 25. *Detailed view and FTIR spectrum of point 2 (****S. Cesta*** *image A) – The spectrum corresponds to Cellulose (Most likely from textile)*

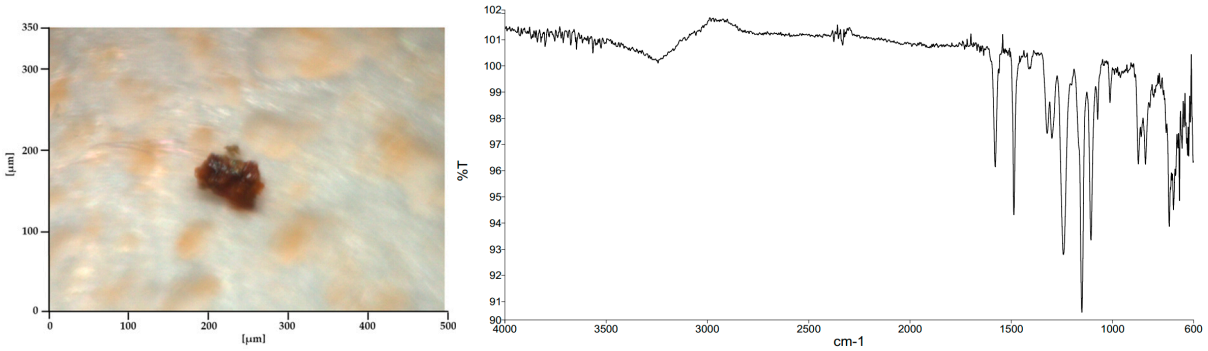


Figure 26. *Detailed view and FTIR spectrum of point 3 (**S. Cesta** image B) – The spectrum corresponds to poly p-phenylene ether sulphone (Filter paper substrate)*

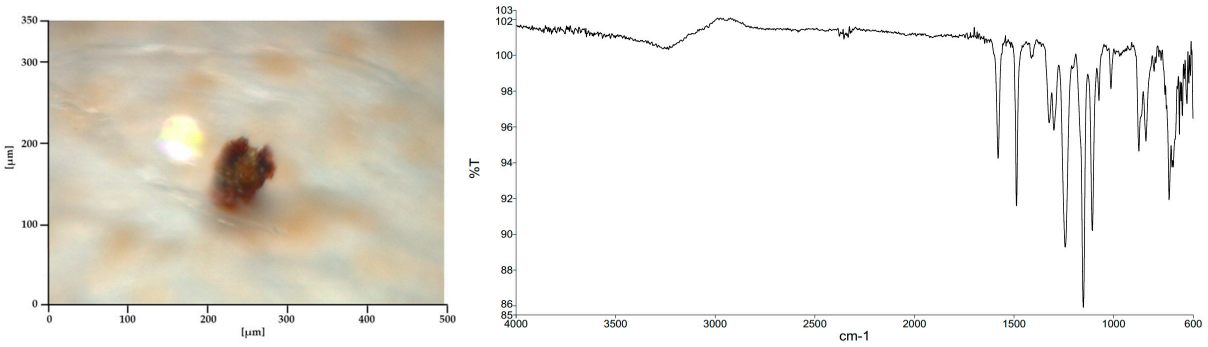


Figure 27. *Detailed view and FTIR spectrum of point 4 (**S. Cesta** image B) – The spectrum corresponds to p-phenylene ether sulphone (Filter paper substrate)*

6. Selo

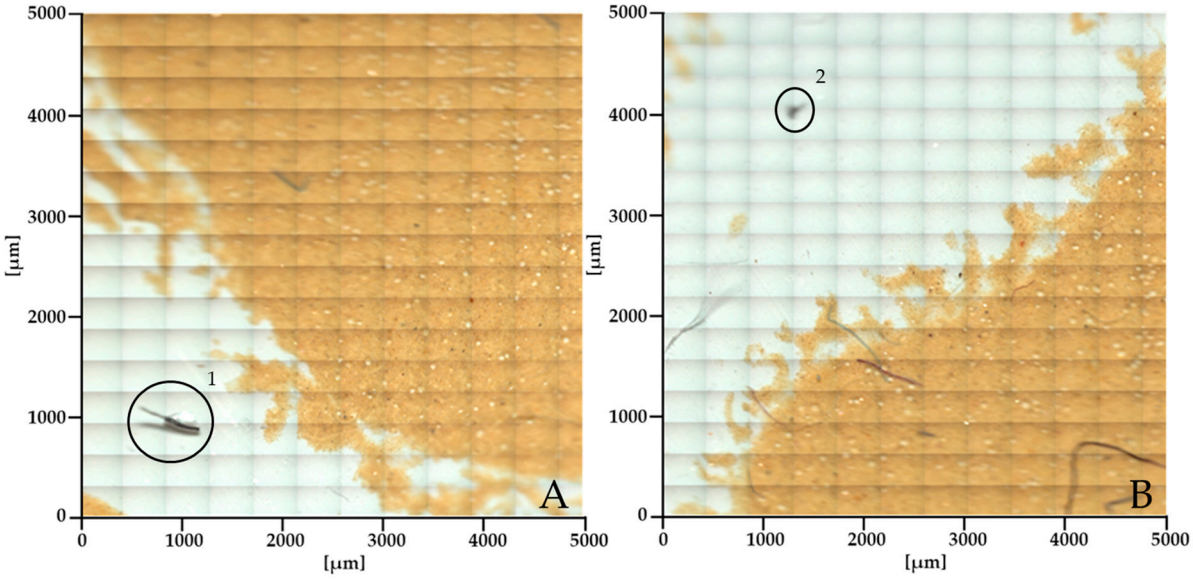


Figure 28. *Stitched FTIR microscopy images of residues taken from the **Selo** soil sample*

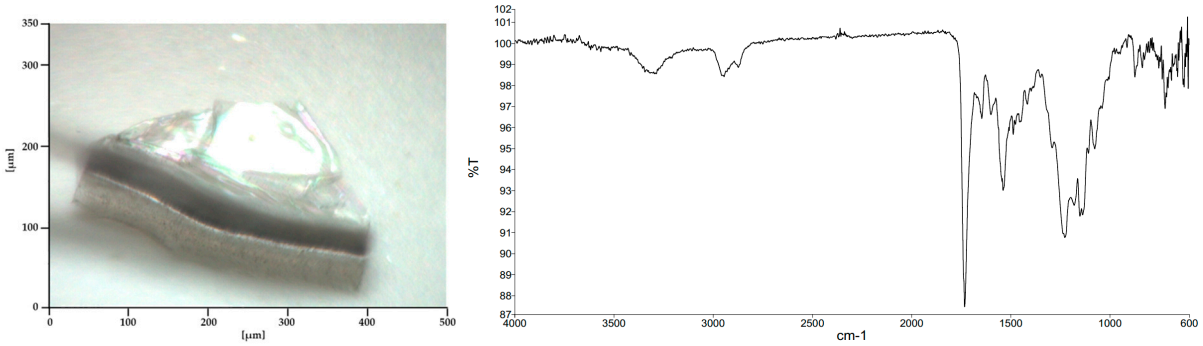


Figure 29. *Detailed view and FTIR spectrum of point 1 (**Selo** image A) – The spectrum corresponds to poly ester urethane.*

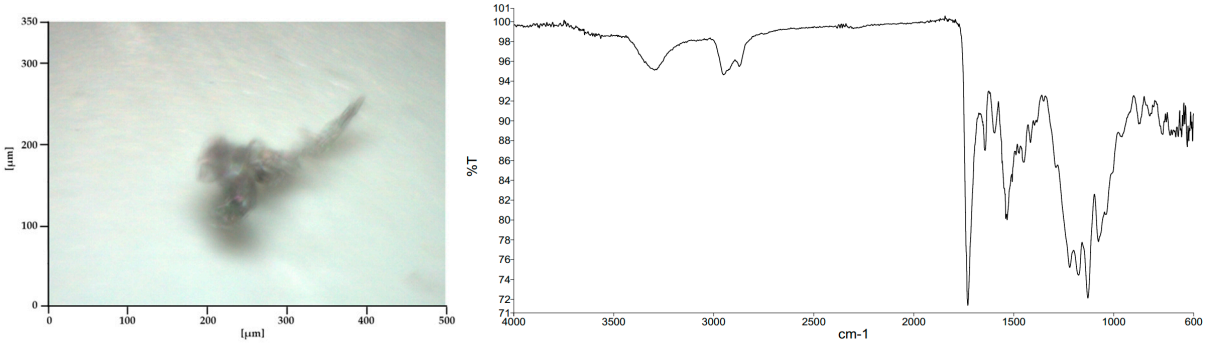


Figure 30. *Detailed view and FTIR spectrum of point 2 (**Selo** image B) – The spectrum corresponds to poly ester urethane.*

7. ⚜bigovci

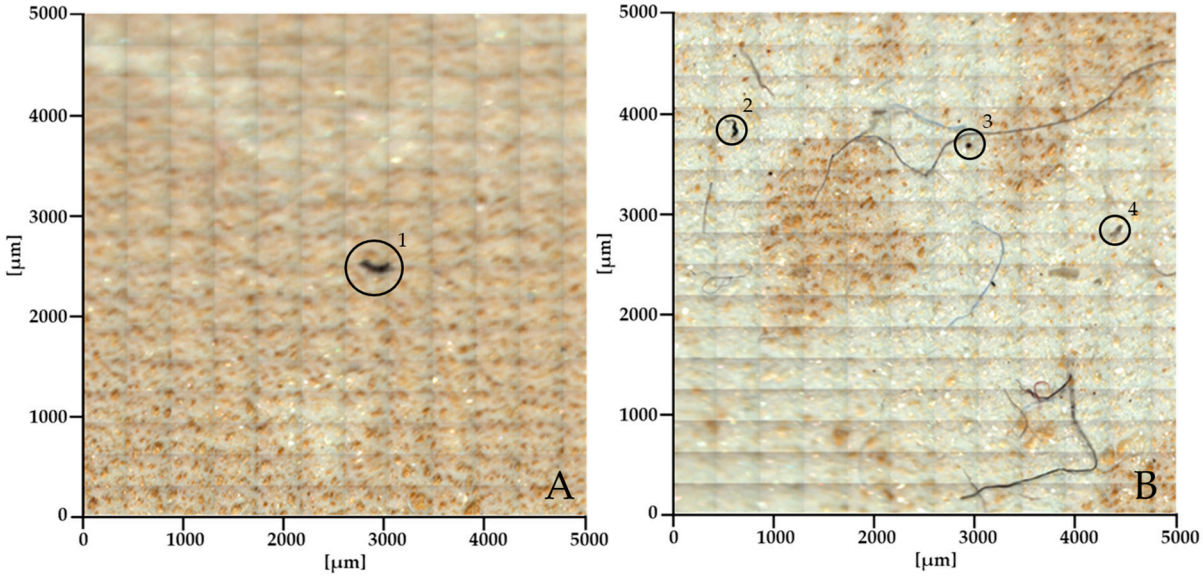


Figure 31. *Stitched FTIR microscopy images of residues taken from the* ***Zbigovci*** *soil sample*

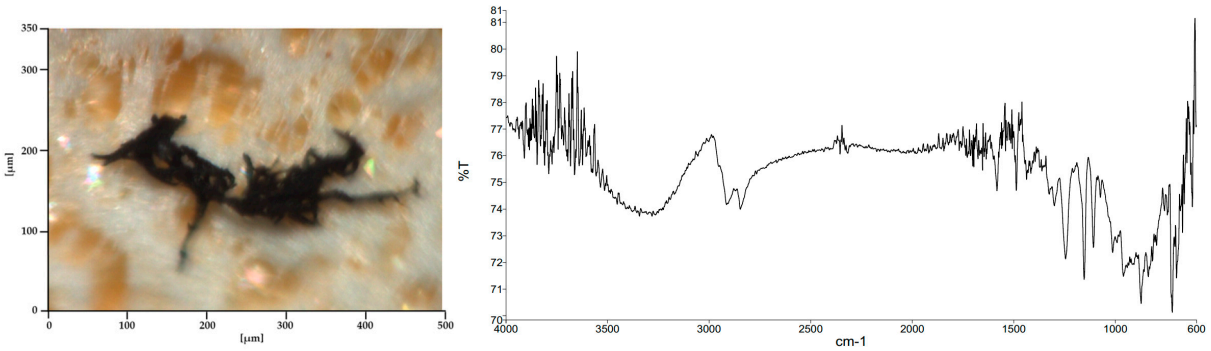


Figure 32. *Detailed view and FTIR spectrum of point 1 (****Zbigovci*** *image A) – The spectrum corresponds to p-phenylene ether sulphone (Filter paper substrate)*

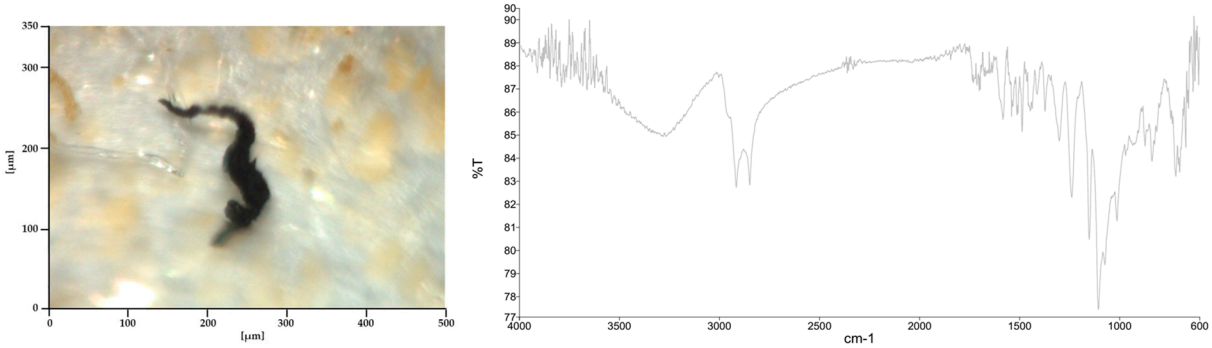


Figure 33. *Detailed view and FTIR spectrum of point 2 (****Zbigovci*** *image B) – The spectrum corresponds to p-phenylene ether sulphone (Filter paper substrate)*

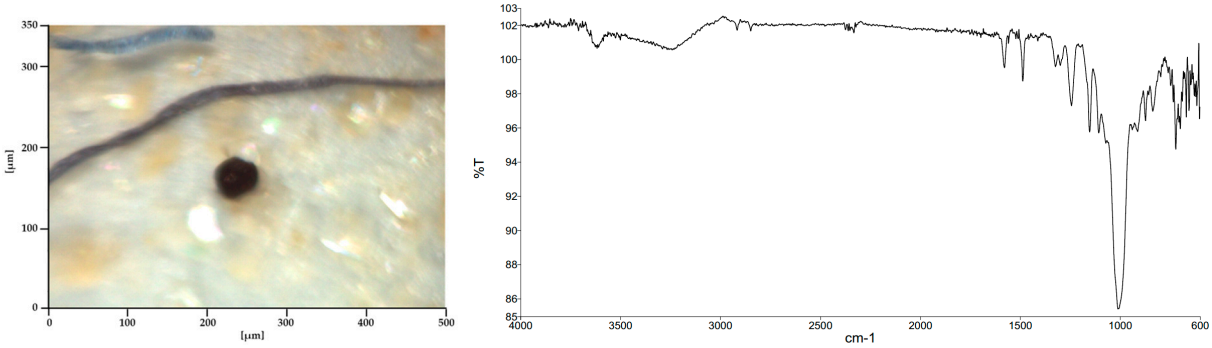


Figure 34. *Detailed view and FTIR spectrum of point 3 (**Zbigovci** image B) – The spectrum sems to corresponds to Maize Starch (Possibly an oxidised residue)*

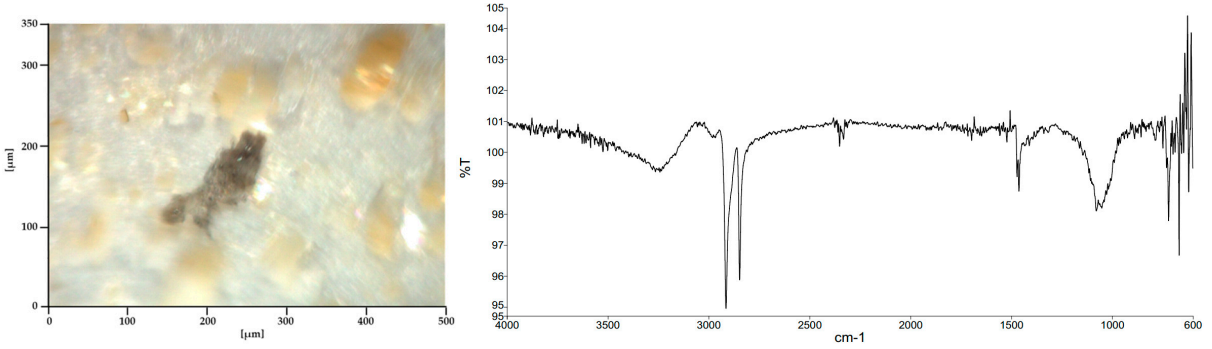


Figure 35. *Detailed view and FTIR spectrum of point 4 (**Zbigovci** image B) – The spectrum corresponds to PE*