

Supplementary Materials

Materials and Techniques of the Mural Paintings in the Church-Ossuary of the Rila Monastery, Bulgaria

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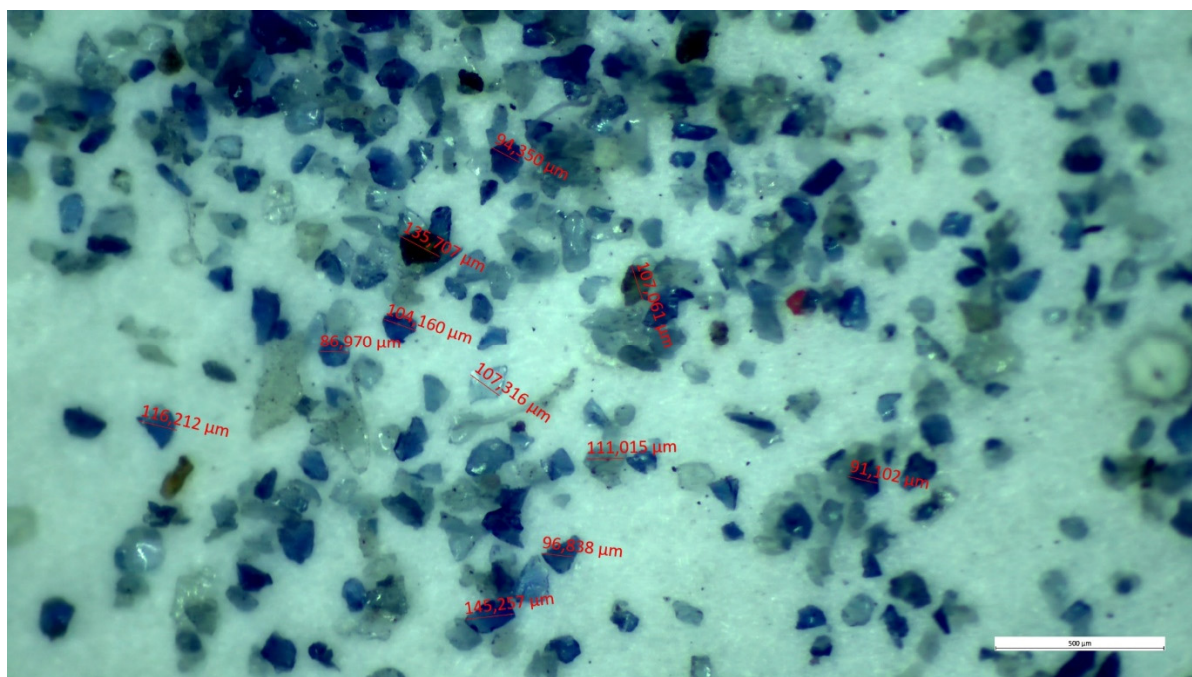
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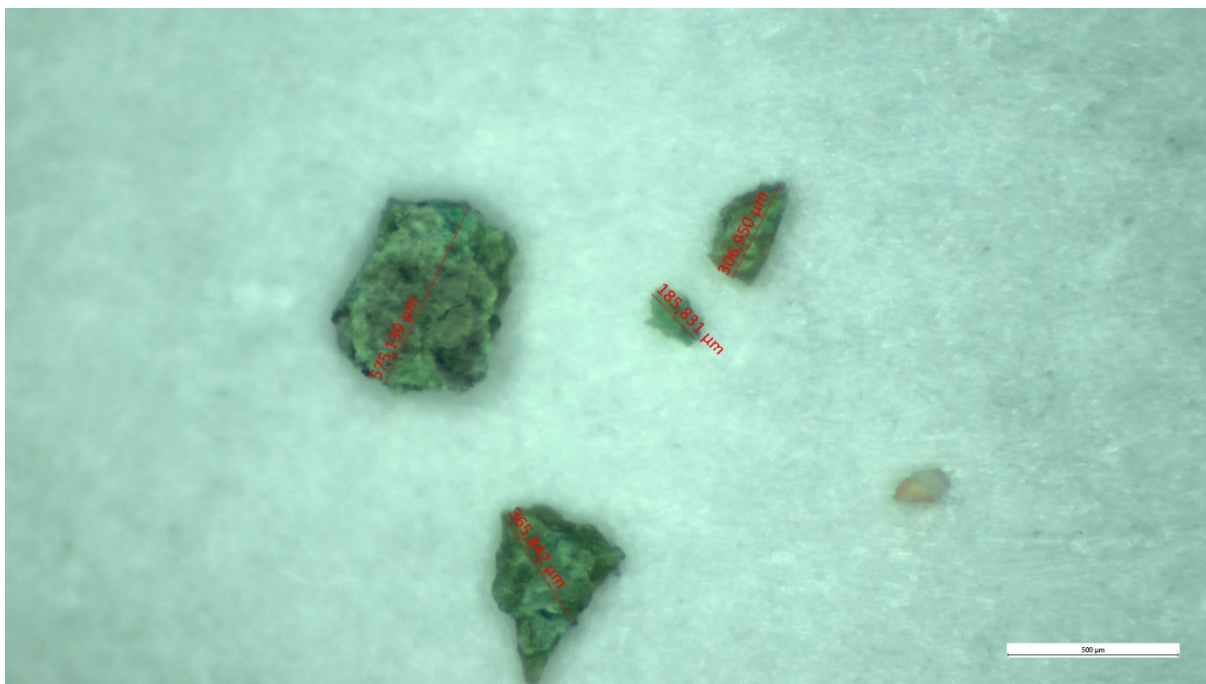
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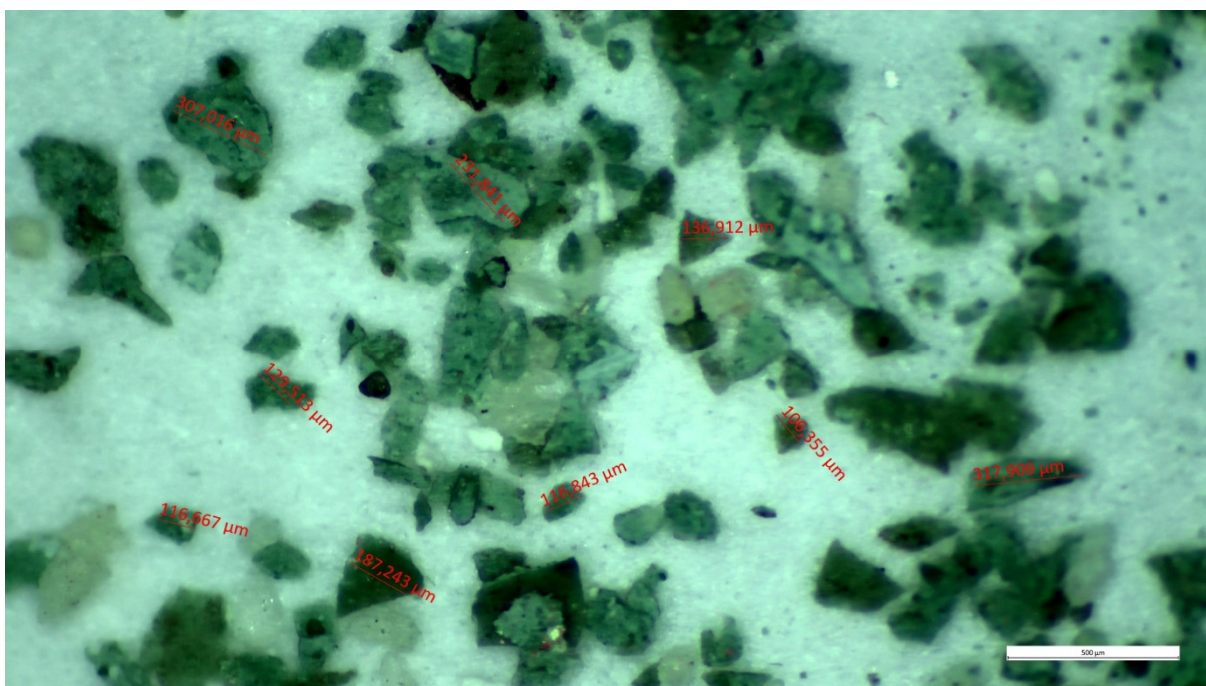
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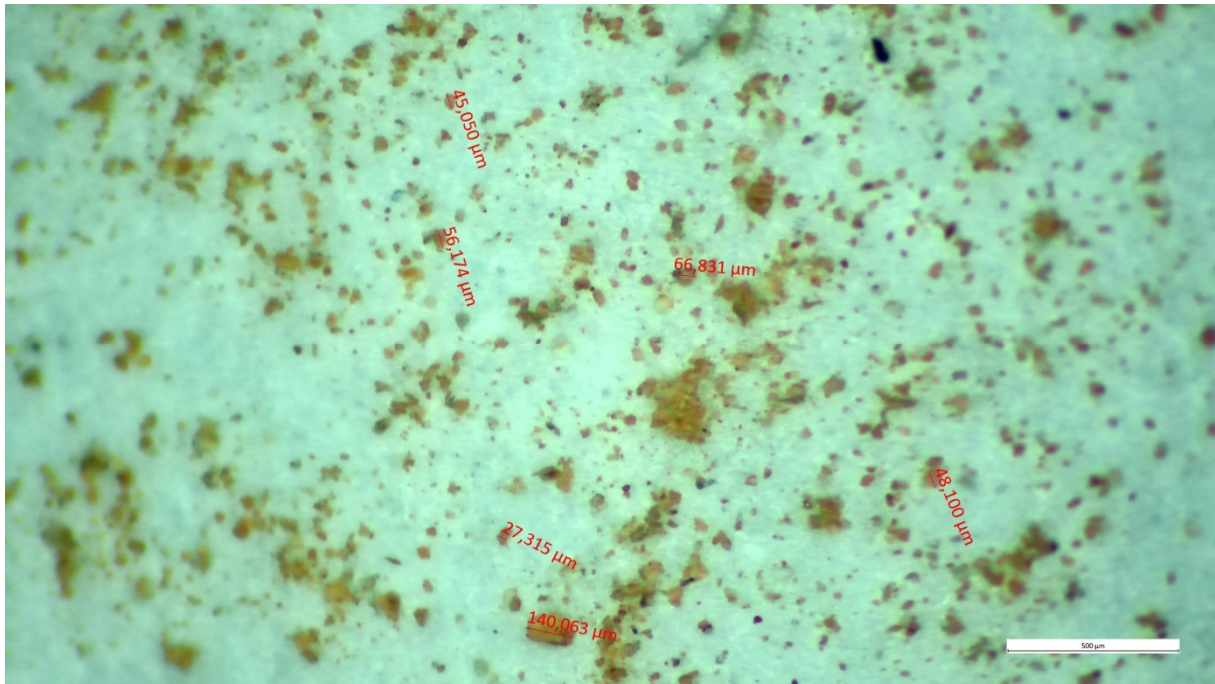
(a) OM image of the blue paint from the background.



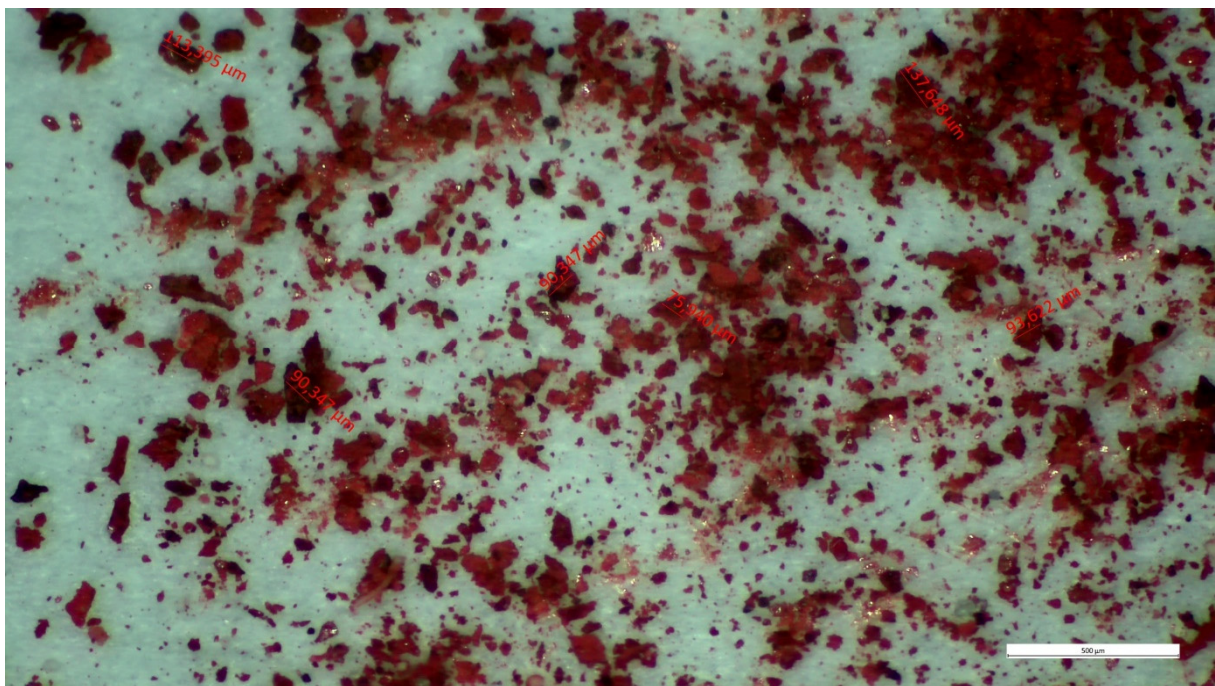
(b) OM image of the green paint from the background.



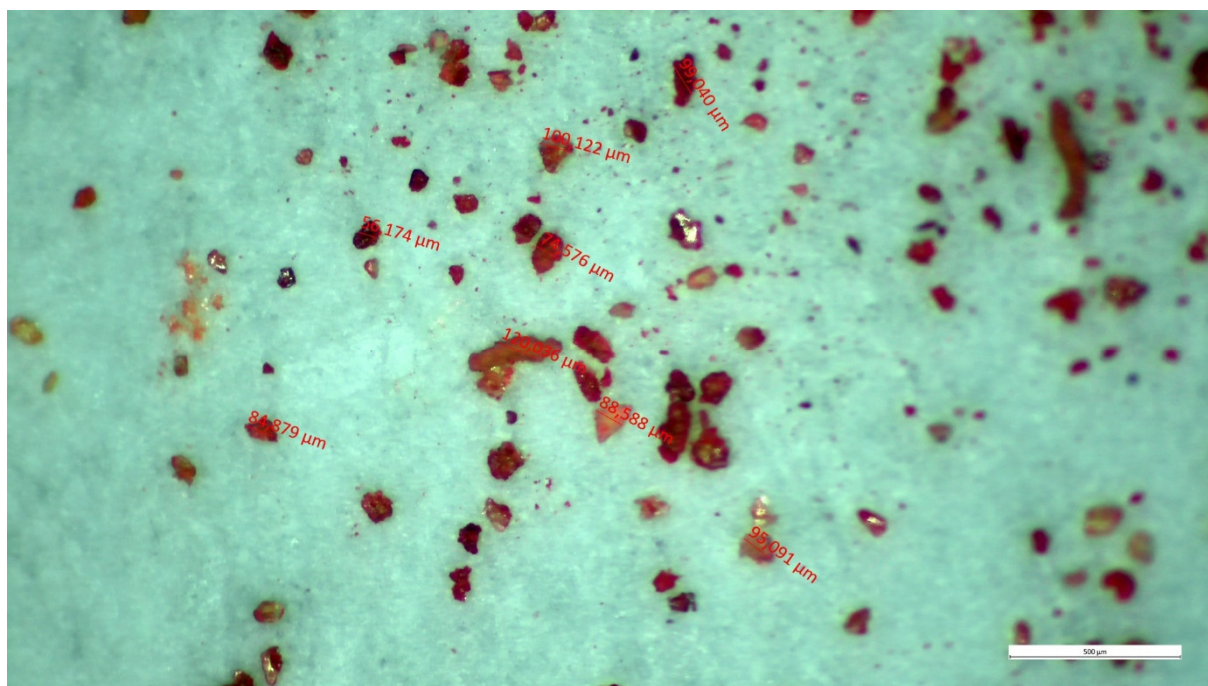
(c) OM image of the green paint from the garments.



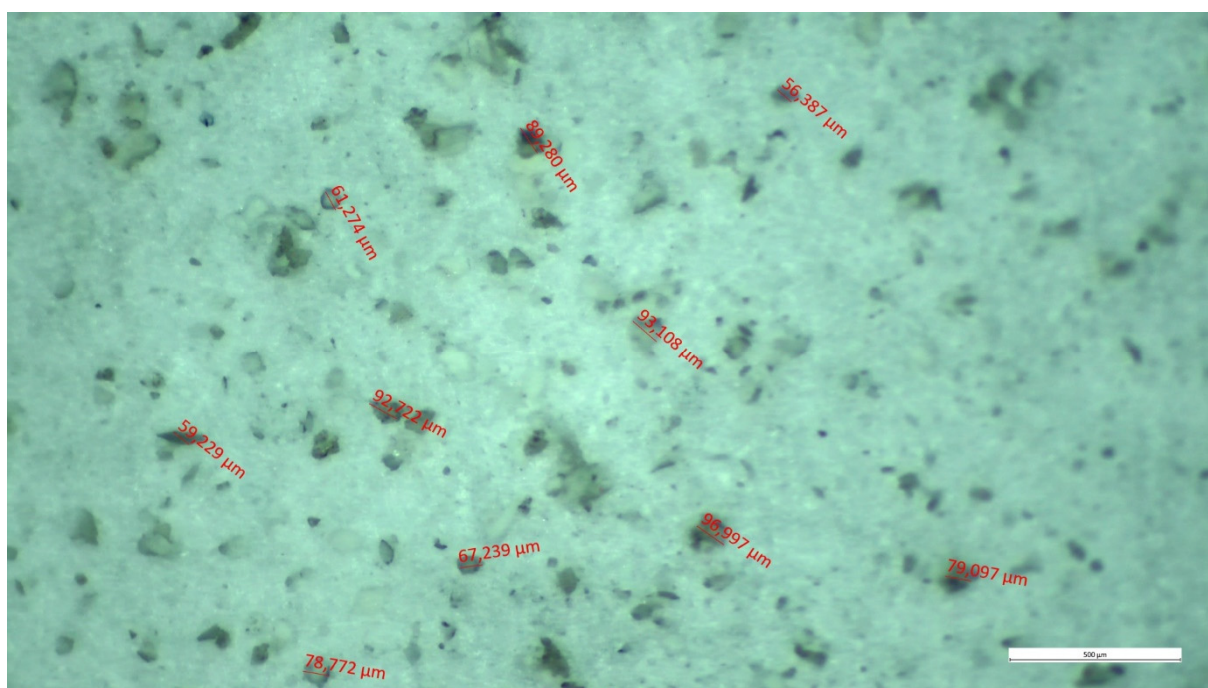
(d) OM image of the yellow paint from the garments.



(e) OM image of the red paint from the garments.



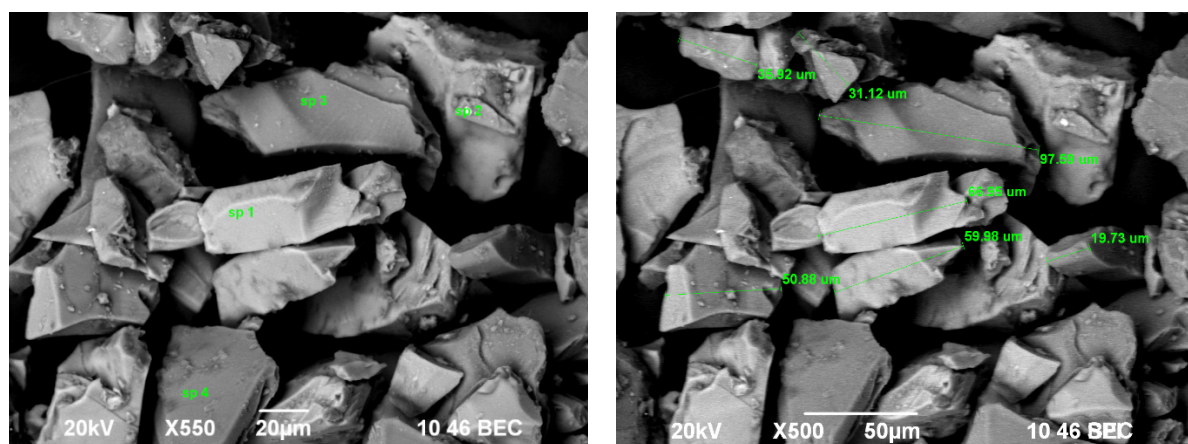
(f) OM image of the red paint from the frame.



(g) OM image of the red paint from the frame.

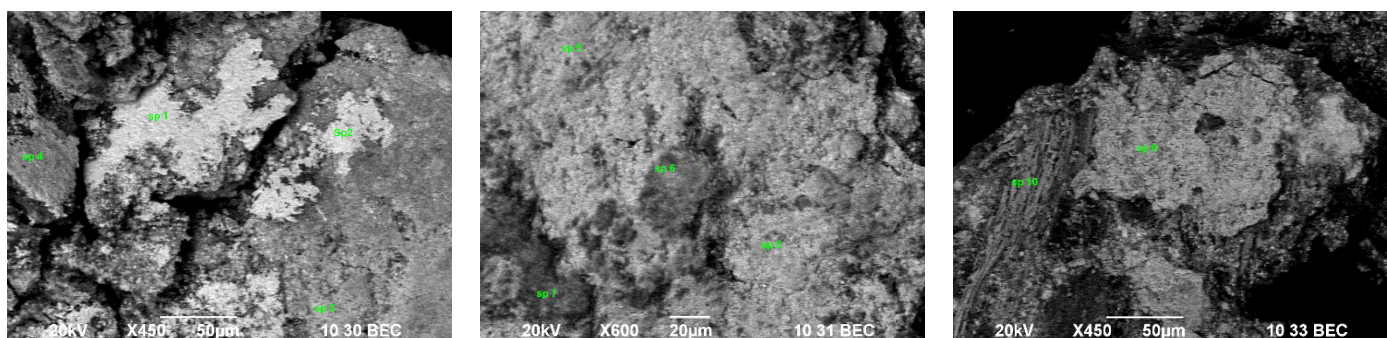
Figure S1. OM images of the studied sample with the measured size of paint grains.

Table S1. EDS results of the blue sample from the background.



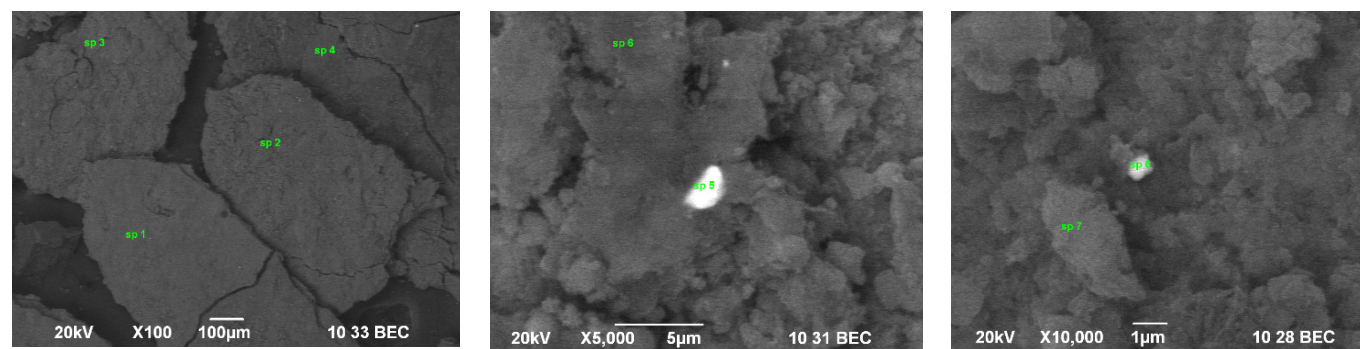
wt %	O	Si	K	Ca	Fe	Co	As
Sp 1	27.71	26.5	16.46	1.78	5.51	7.41	2.52
Sp 2	29.25	9.88	2.94	2.62	0.47	0.53	5.05
Sp 3	52.07	33.39	8.37	1.18	1.05	0.8	2.27
Sp 4	54.95	26.53	5.81	2.87	0	5.47	4.37

Table S2. EDS results of the green sample from the background.



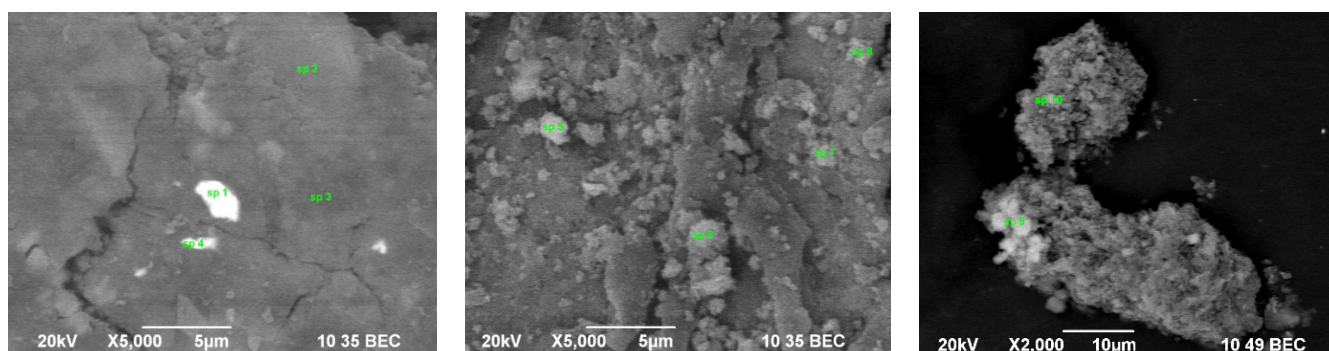
wt %	C	O	Al	Si	S	Ca	Cu	Pb
Sp 1	5.6	20.72	0.38	0.67	0	1.51	8.96	62.16
Sp 2	3.85	17.35	0.57	1.07	0	3.08	8.06	65.35
Sp 3	9.29	29.1	0.52	0.95	6.2	5.49	2.7	45.1
Sp 4	7.14	25.53	0.5	0.86	0	1.68	10.74	53.54
Sp 5	7.14	26.35	0	0	7.49	2.03	4.55	52.44
Sp 6	14.82	31.34	1.14	2.18	4.22	2.67	6.98	36
Sp 7	18.18	37.42	0.8	1.17	3.83	8.05	2.98	27.57
Sp 8	7.32	27.11	0	0	6.87	2.03	6.87	49.79
Sp 9	8.92	23.45	0	0	8.41	1.12	5.73	52.37
Sp 10	8.87	31.72	0	0	4.98	1.89	18.52	34.02

Table S3. EDS results of the green sample from the garments.



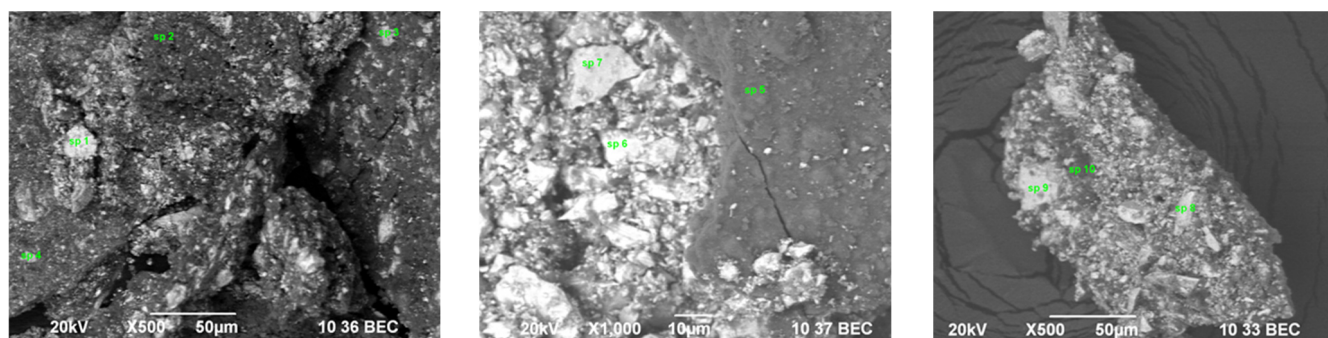
wt %	C	O	Mg	Al	Si	S	K	Ca	Fe
Sp 1	18.8	40.93	1.07	0	3.72	0	1.6	31.74	2.15
Sp 2	15.55	40.64	2.91	0.84	13.55	0.98	6.05	11.32	8.16
Sp 3	14.63	41.99	3.19	1	12.41	0	3.93	14.73	7.58
Sp 4	19.33	46.01	0.86	0.36	3.71	0	1.39	26.33	2
Sp 5	29.96	47.97	1.34	1.46	6.14	0	2.21	8.89	2.03
Sp 6	18.94	43.2	1.2	0	3.18	0	1.08	30.67	1.73
Sp 7	22.97	50.98	0.95	0.56	2.44	0	1.16	20.03	0.9

Table S4. EDS results of the yellow sample from the garments.



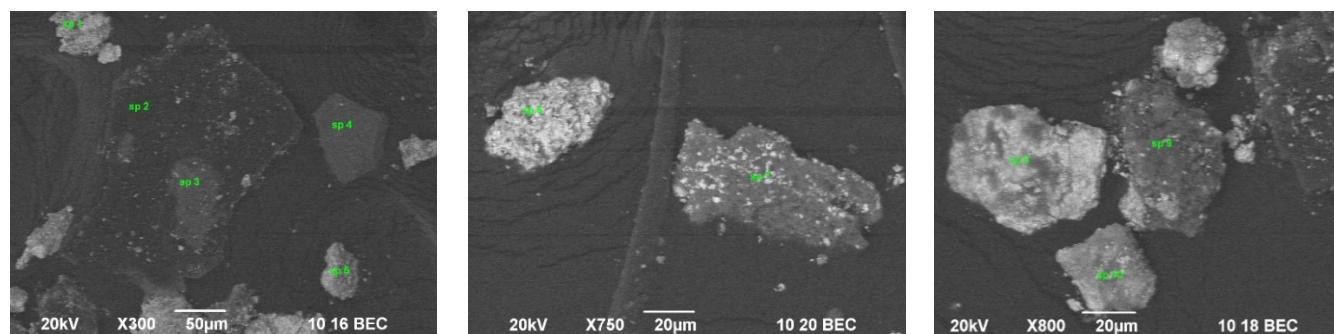
wt %	C	O	Mg	Al	Si	K	Ca	S	Fe
Sp 1	13.11	23.84	0	1.09	1.87	0	9.79	45.42	4.15
Sp 2	22.59	45.76	1.45	3.71	6.96	2.31	8.47	0.46	8.28
Sp 3	24.09	33.2	0.89	1.95	4.94	1.1	23.6	0	10.23
Sp 4	12.28	19.14	0	0	5.32	0	25.9	25.82	11.53
Sp 5	18.42	47.27	0	0.97	1.15	0	15.58	0	16.61
Sp 6	20.5	32.14	0	0	1.68	0	38.88	0	6.8
Sp 7	7.5	34.11	0	0	1.15	0	52.9	0	4.34
Sp 8	9.07	26.04	0	0	0	0	55.6	0	9.29
Sp 9	17.91	37.06	0	0.65	0.55	0	3.61	0	40.22
Sp 10	17.9	46.46	0	0.88	0.54	0	14.98	0	19.24

Table S5. EDS results of the red sample from the garments.



wt %	C	O	Al	Si	S	K	Ca	Fe	Hg
Sp 1	0	0	0	0	4.59	0	0.85	0	94.57
Sp 2	10.9	41.78	0	0	1.61	0	31.5	0	14.21
Sp 3	9.58	17.91	0	0	2.78	0	5.76	0	63.97
Sp 4	9.92	11.71	0	0	13.81	0	2.41	0	62.15
Sp 5	9.77	38.19	0.86	2.92	0	0	23.56	24.7	0
Sp 6	0	0	0	0	0	0	1.59	4.07	94.34
Sp 7	0	0	0	0	0	0		2.48	97.52
Sp 8	2.18	0	0	0	7.6	0	1.17	1.3	87.75
Sp 9	17.33	53.19	0.46	1.46	4.41	0.26	12.38	5.16	5.36
Sp 10	12.07	47.22	0.46	2.28	1.38	0.28	14.98	19.04	2.3

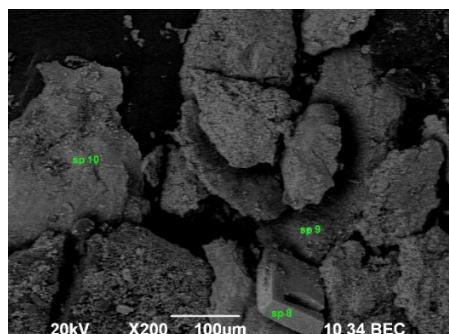
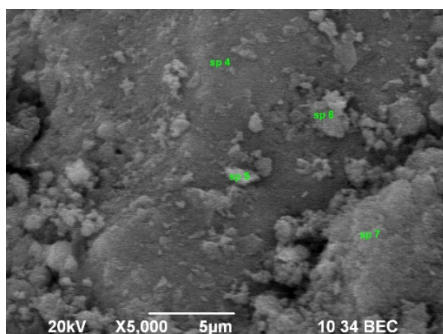
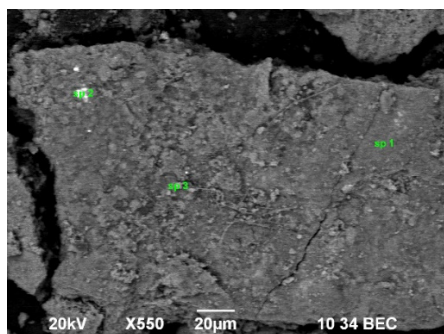
Table S6. EDS results of the orange sample from the frame.



wt %	C	O	Ca	Pb
Sp 1	16.38	15.72	1.25	66.65
Sp 2	84.98	15.02	0.0	0.0
Sp 3	68.97	15.33	0.75	14.95
Sp 4	10.82	50.87	38.31	0.0
Sp 5	18.33	20.62	2.29	58.76

Sp 6	14.1	15.98	0.74	69.18
Sp 7	13.04	40.97	27.7	18.28
Sp 8	16.06	24.57	4.81	53.73
Sp 9	13.77	43.04	29.76	13.43
Sp 10	18.9	21.89	6.12	53.09

Table S7. EDS results of the white sample from the frame.



wt %	C	O	Mg	Al	Si	Ca	Cu	Sn
sp 1	19.68	54.19	0.73	1.11	3.13	0	20.56	0
sp 2	27.21	52.27	0	0	1.72	0	6.71	3.46
sp 3	30.85	58.46	0	0	0.66	0	10.03	0
sp 4	17.91	60.59	0	0	0.64	0	20.54	0
sp 5	21.96	60.77	0	0	0.33	0	16.39	0
sp 6	21.11	63.19	0.41	0.32	0.8	0	12.3	0
sp 7	22.52	61.8	0	0	0.28	0	15.41	0
sp 8	66.72	11.2	2.6	0		18.43	1.04	0
sp 9	27.55	52.12	0	0.55	1.22	0.28	13.18	1.48
sp 10	20.8	64.58	0	0		0	14.62	0

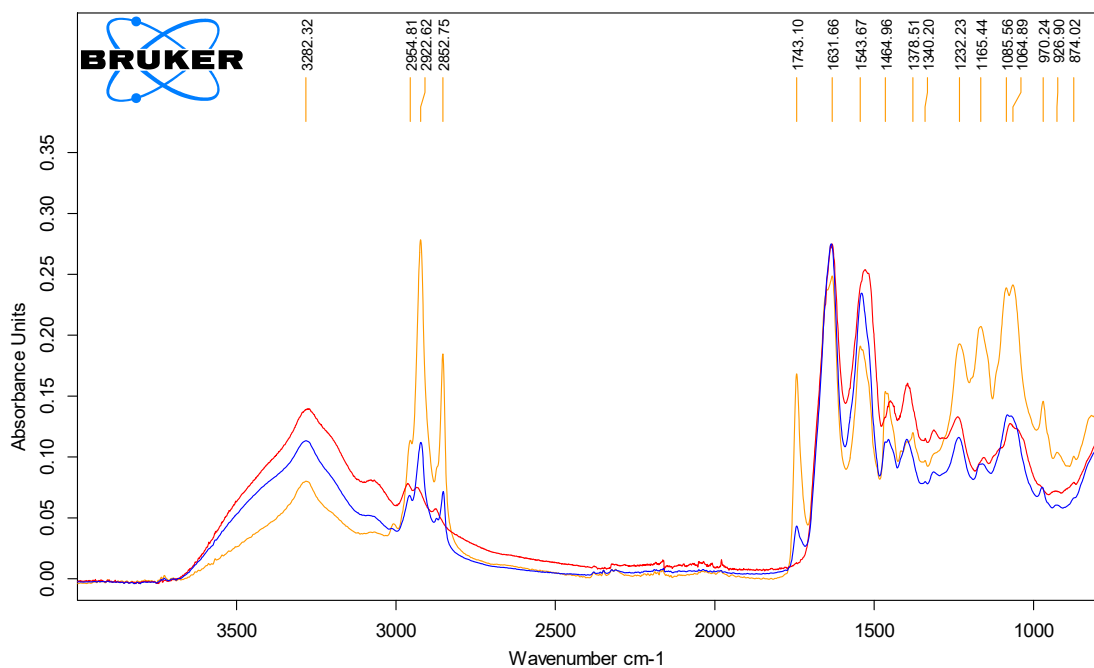
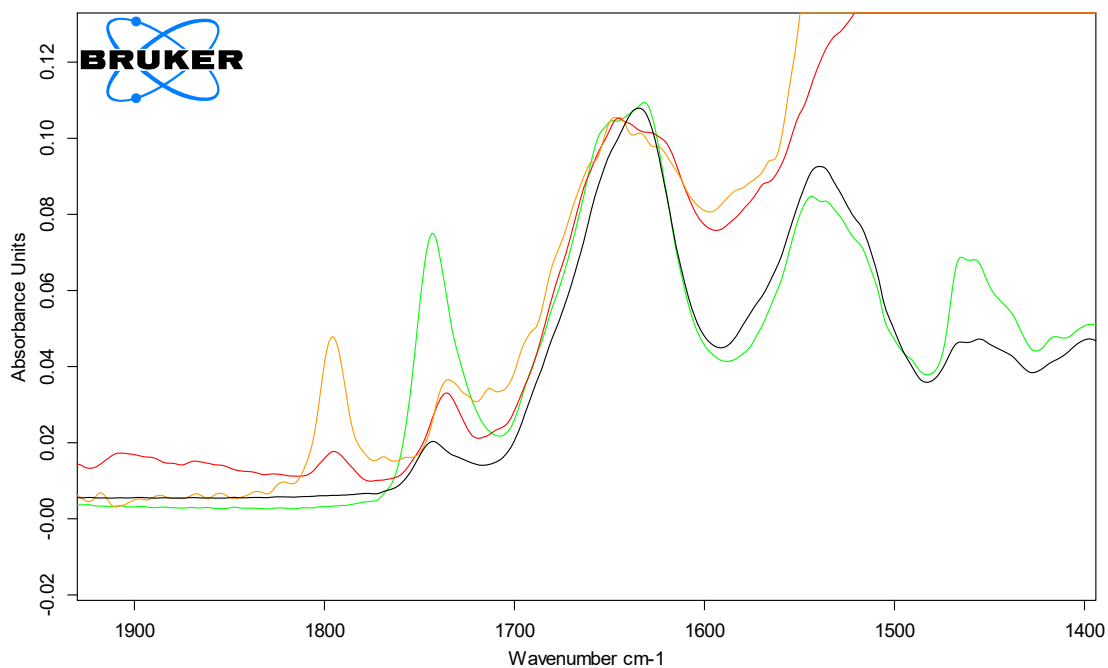


Figure S2. FTIR spectra of dried whole egg (in blue), egg white (in red), and egg yolk (in orange).



H:\database - all\organic materials ATR\egg dried 2015.0	egg dried 2015	ATR	5.6.2017 a.
D:\RilaMonastery_GT_2\spectri GR TS\White RM_grob curkva_8_white.txt			
D:\RilaMonastery_GT_2\spectri GR TS\Red lead RM_grob curkva_7_orange=.txt			
H:\database - all\organic materials ATR\yolk dried 2015.0	yolk dried 2015	ATR	5.6.2017 a.

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Figure S3. FTIR spectra of dried whole egg (in black), dried yolk (in green), white paint from the frame (in yellow), and red from the frame (in red).

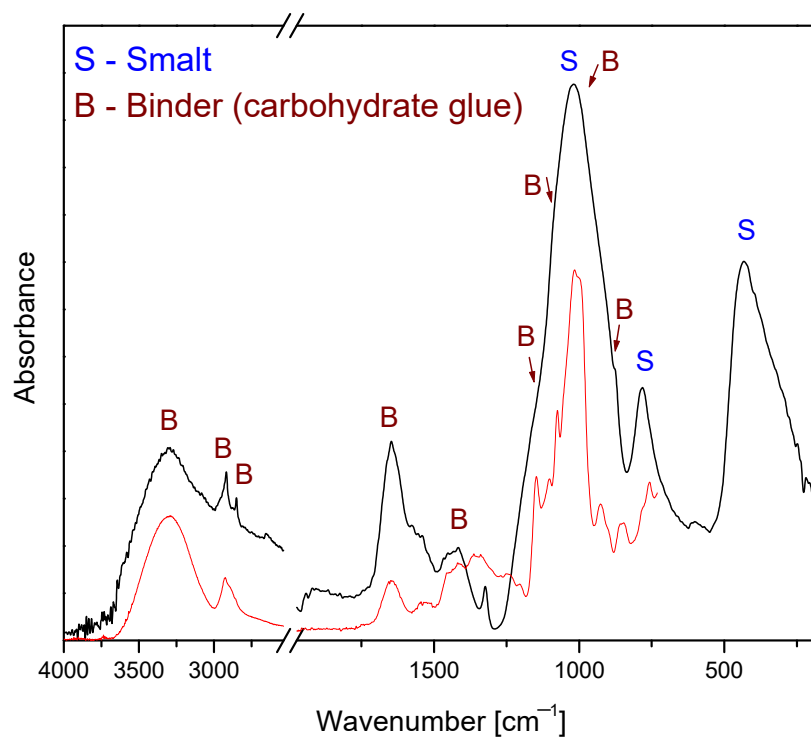


Figure S4. FTIR spectrum of the blue sample from the background (in black) and carbohydrate glue (in red).