JINR Young Scientists and Specialists Association
Workshop “Alushta-2022”

NEUTRON TOMOGRAPHY AND DIFFRACTION IN THE STUDY OF METAL OBJECTS OF CULTURAL HERITAGE

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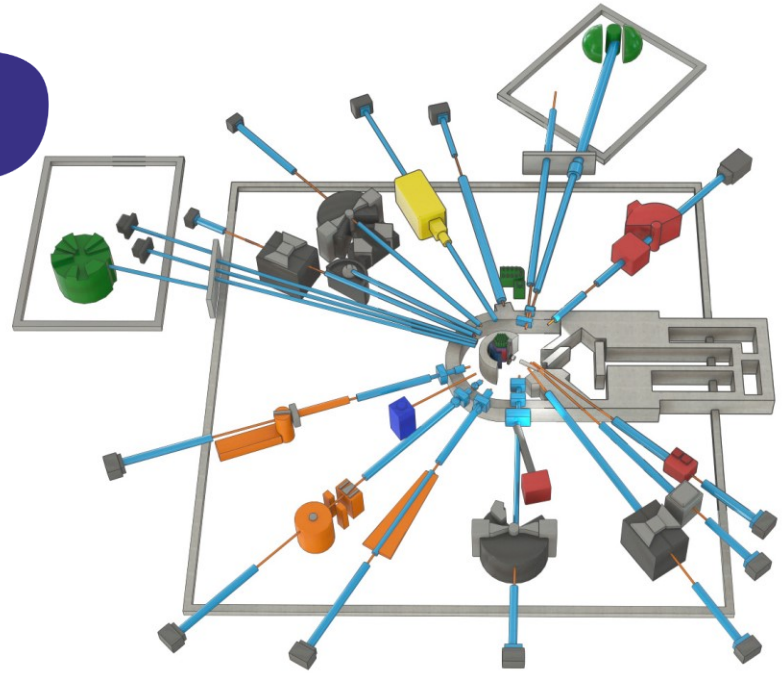
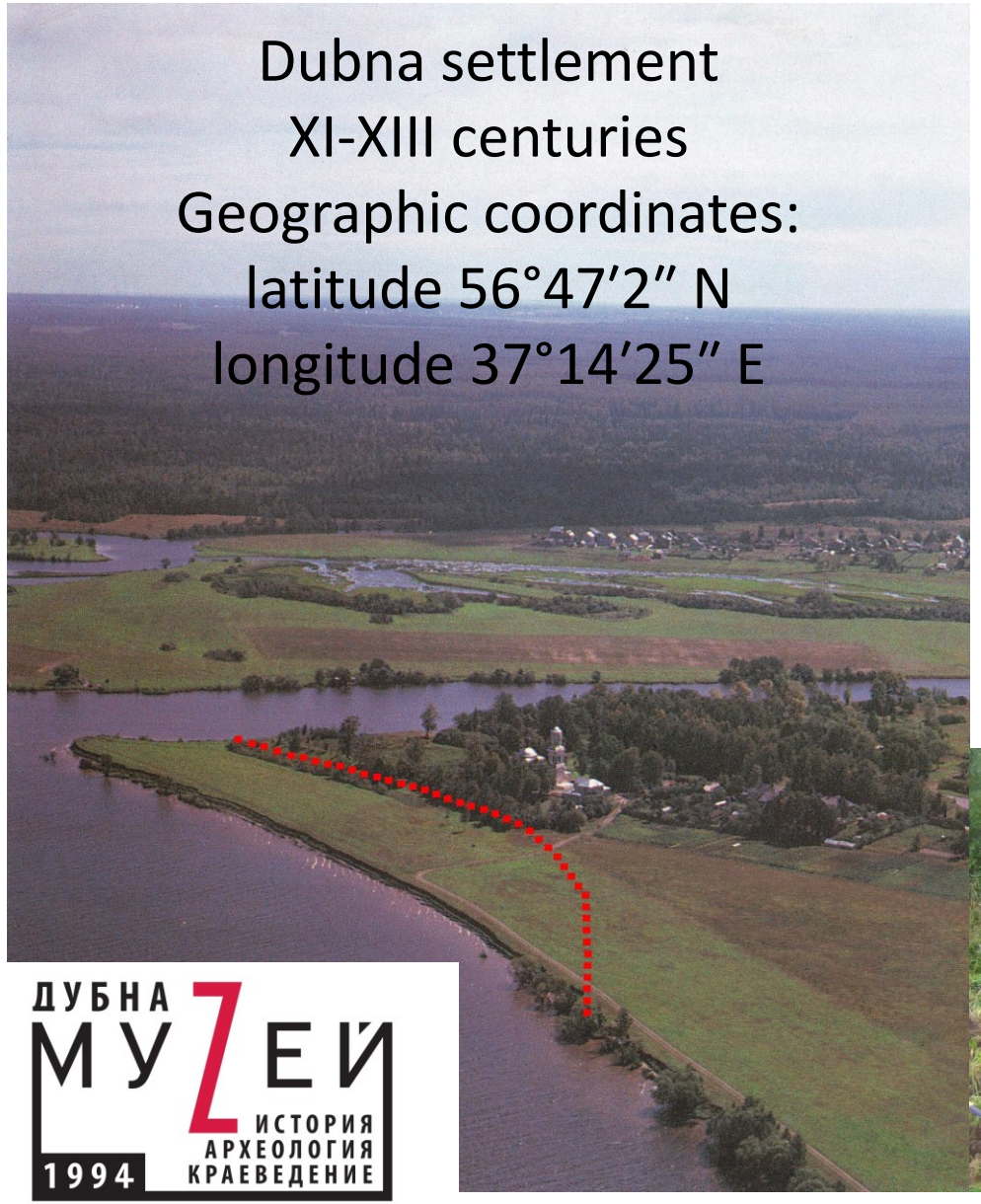
Alushta, 2022



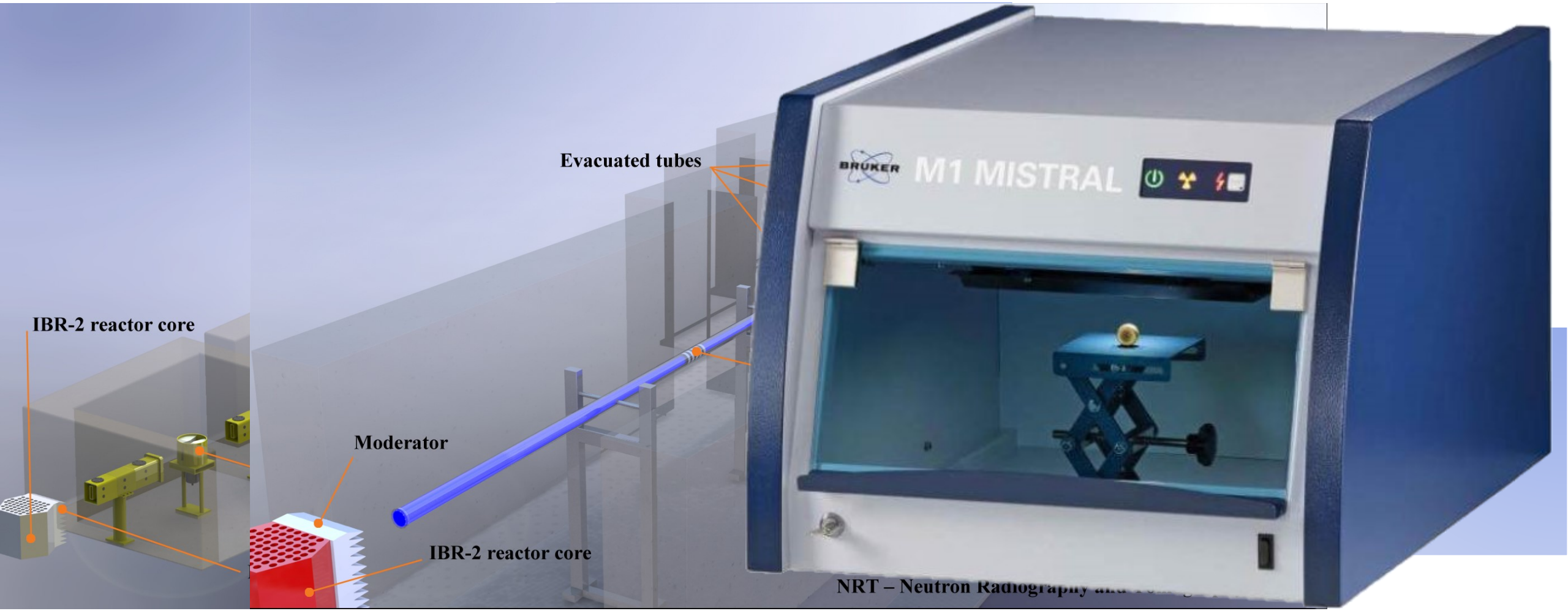
Archaeological metal samples for research in FLNP



Objectives

Research:

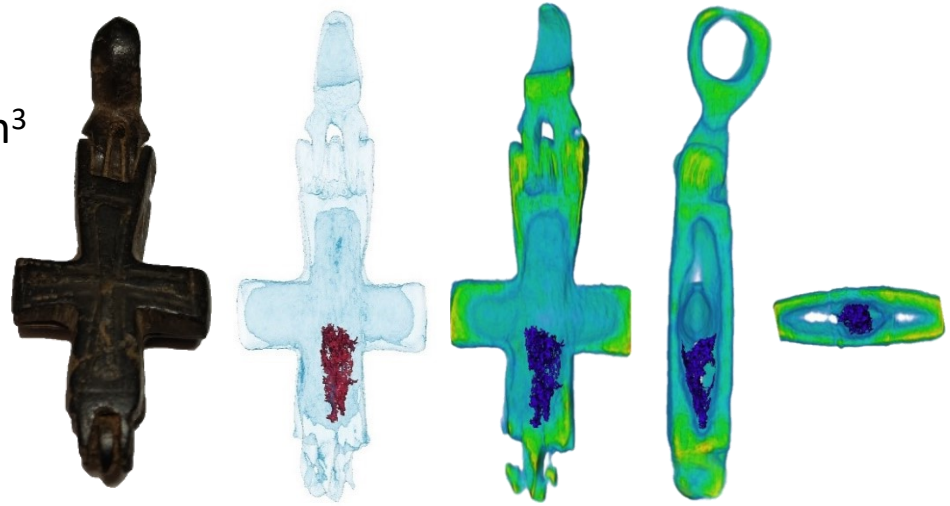
- ✓Internal structure
- ✓Volumetric composition
- ✓Surface composition
- ✓Technique

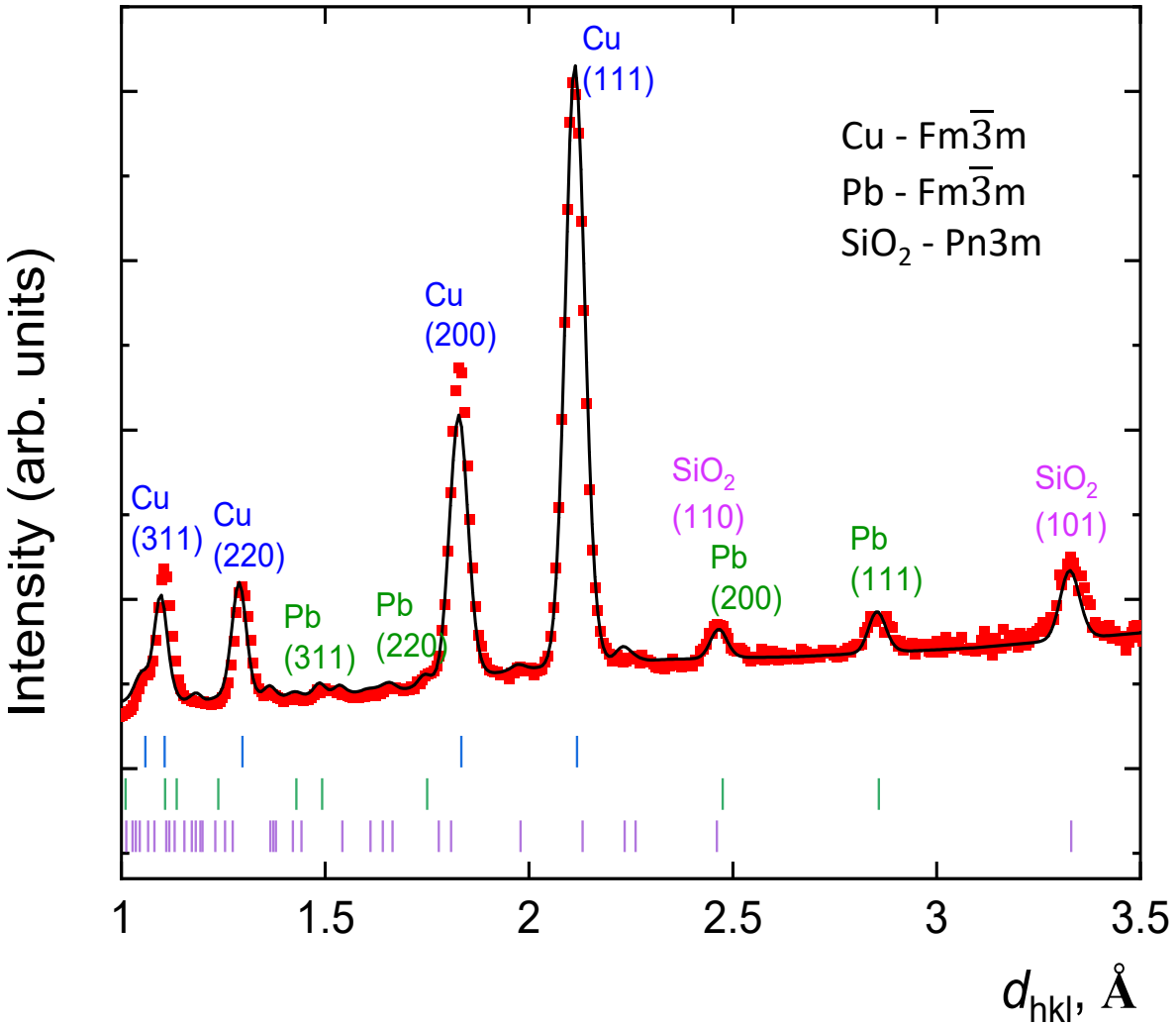


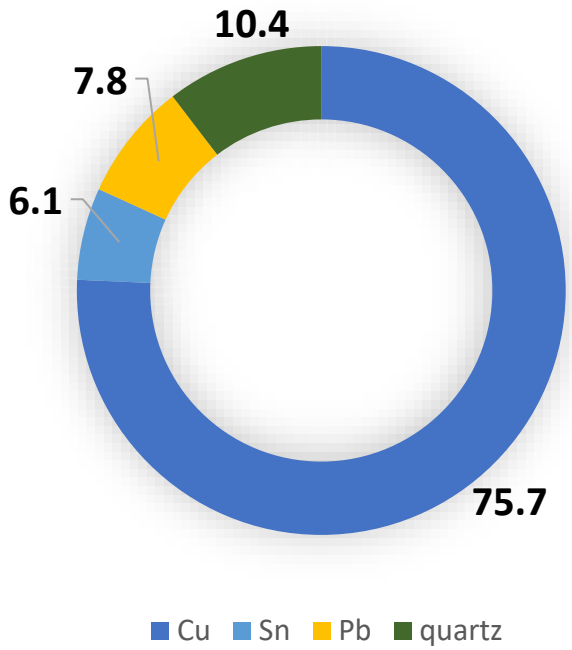
NRT – Neutron Radiography and

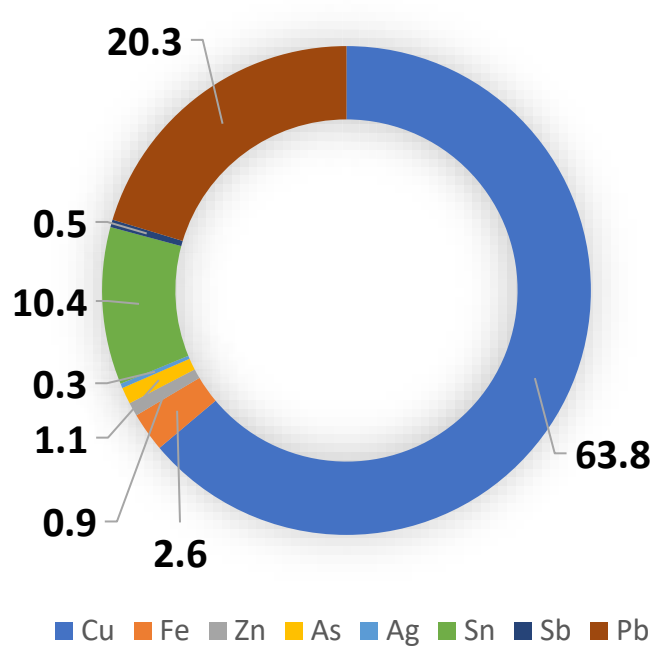
№1431

V_{all} = 1.74 cm^3
$V_{int.mat.}$ = 0.006 cm^3









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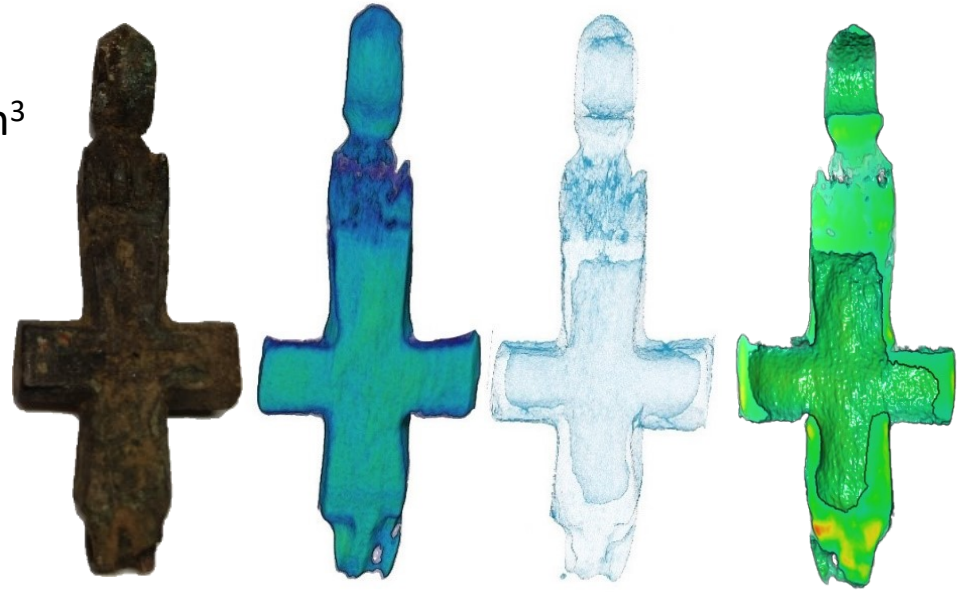
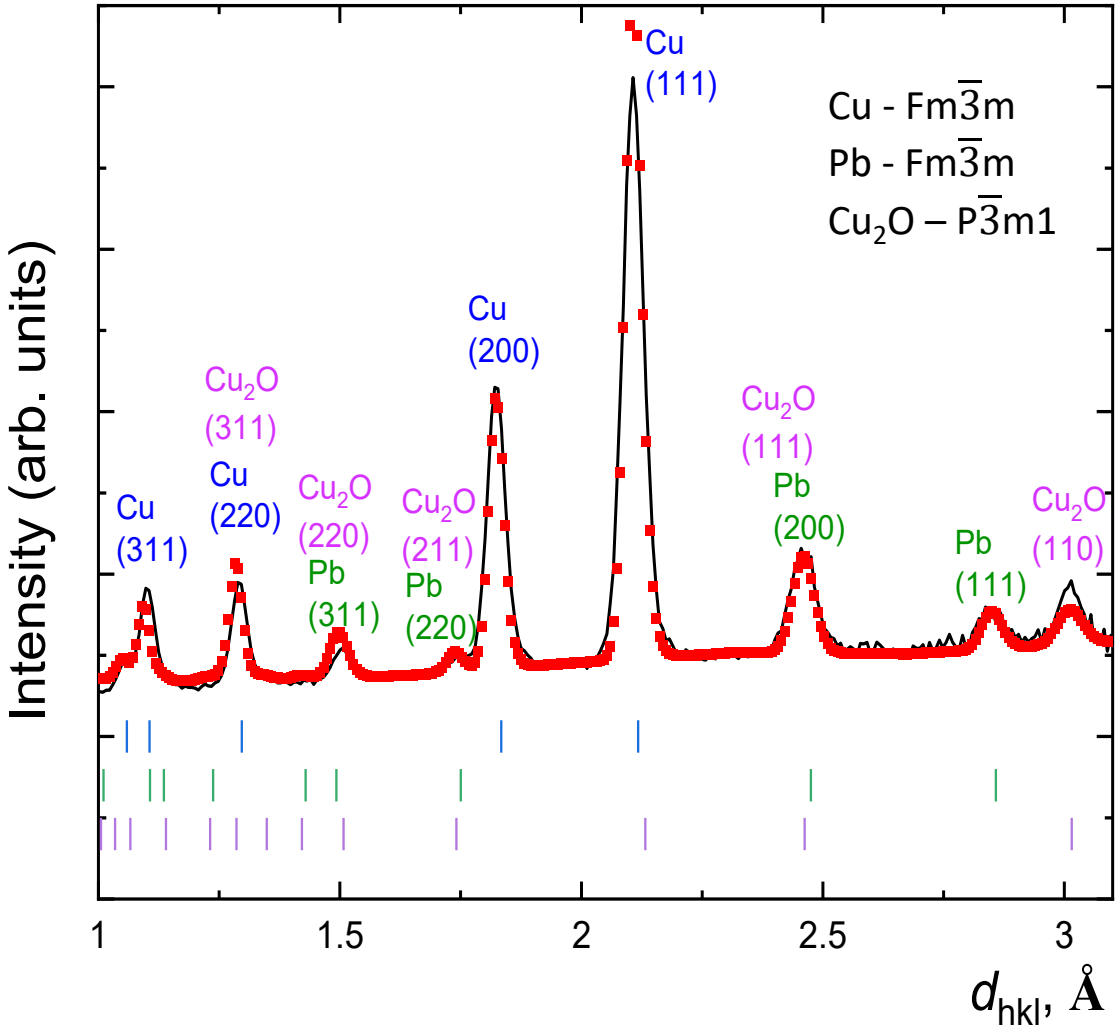
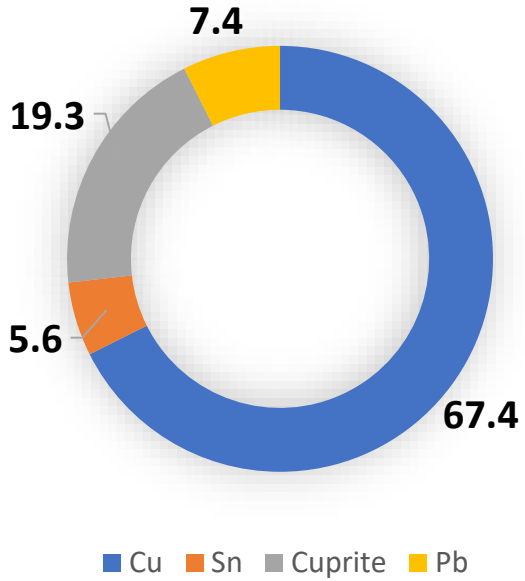
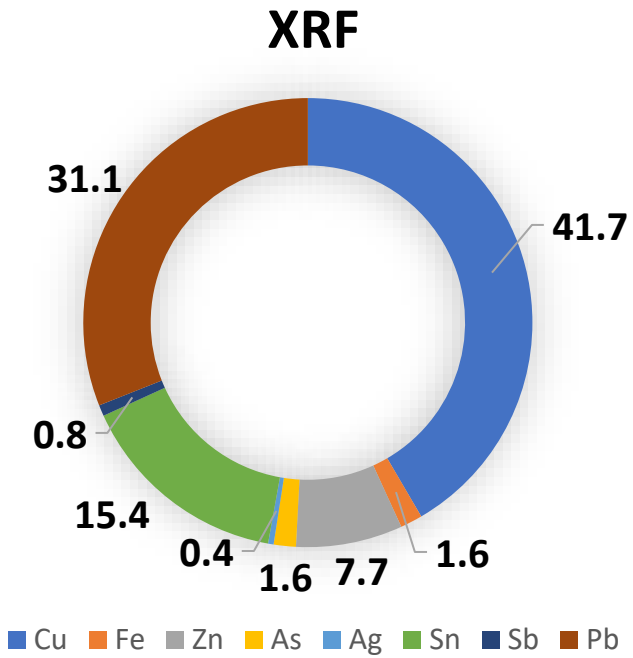
V_{all} = 1.13 cm^3
$V_{corros.}$ = 0.19 cm^3
(16.8%)

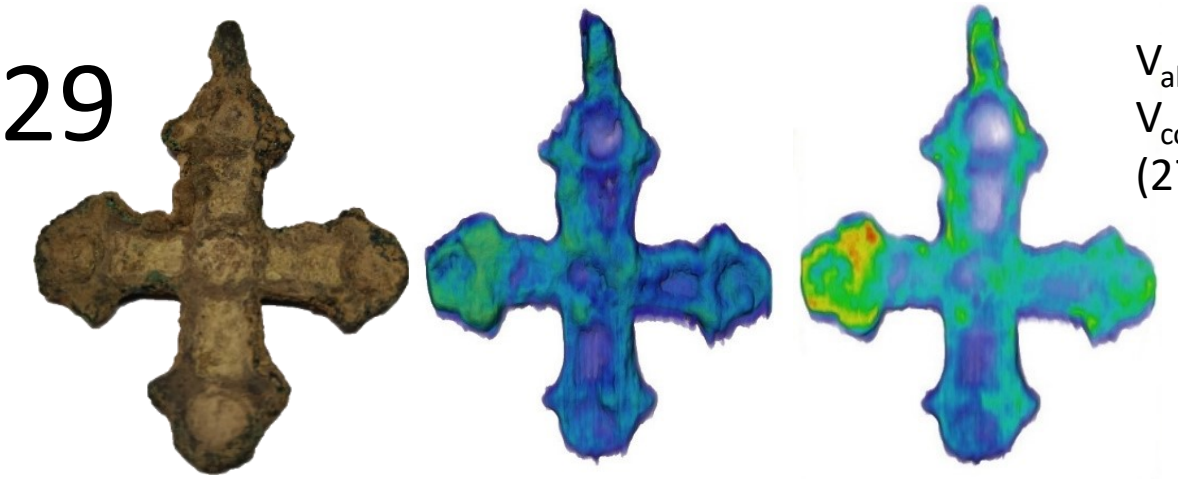




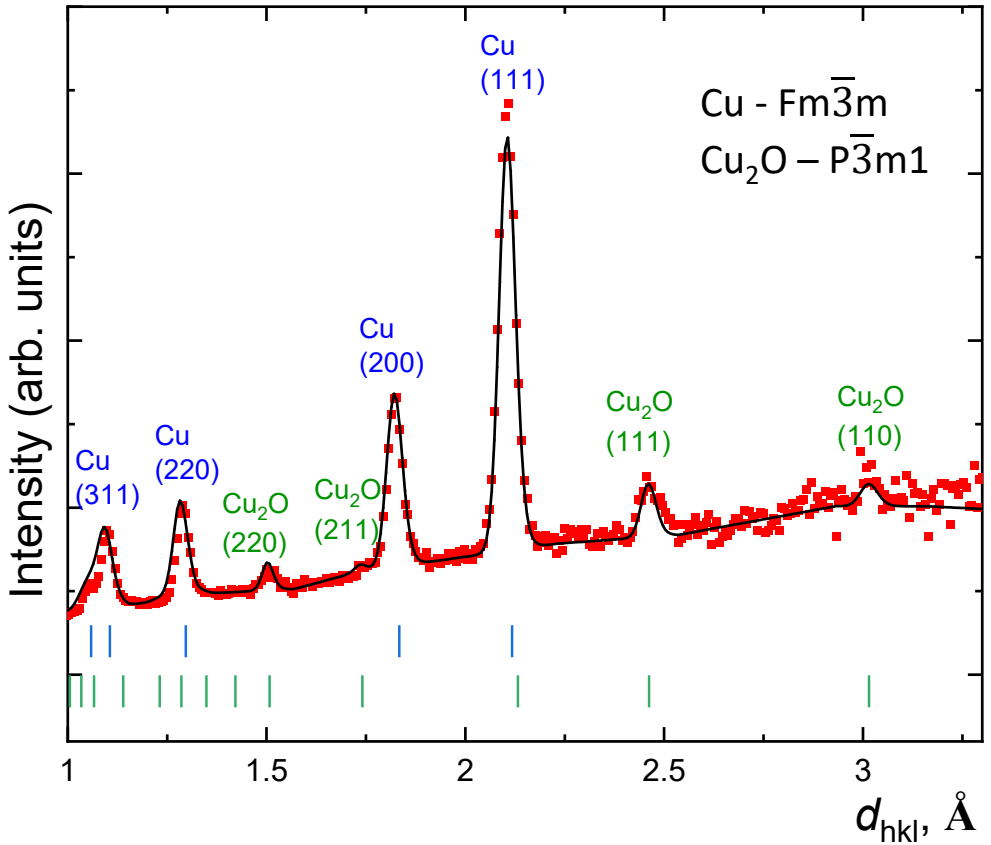


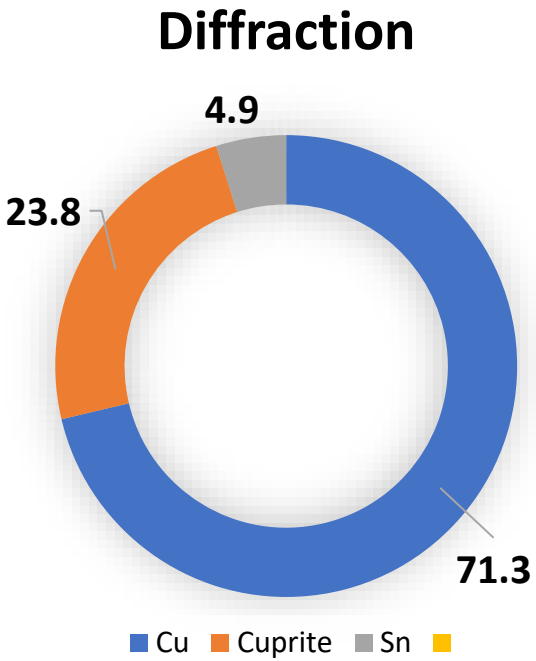


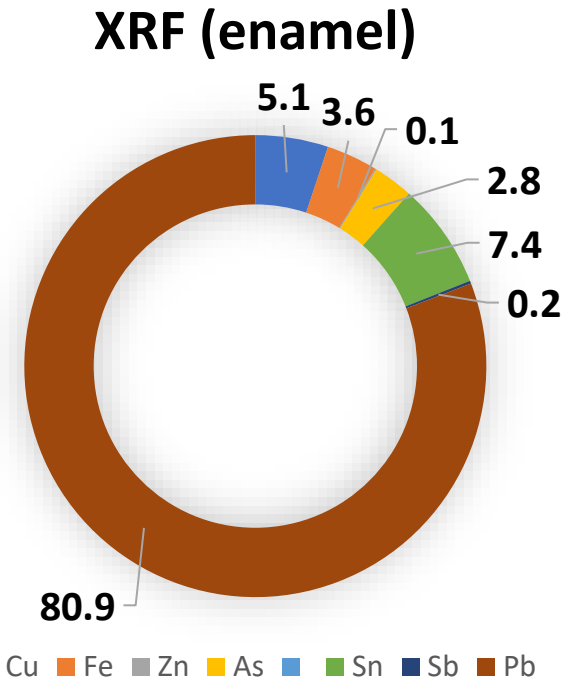
№1629

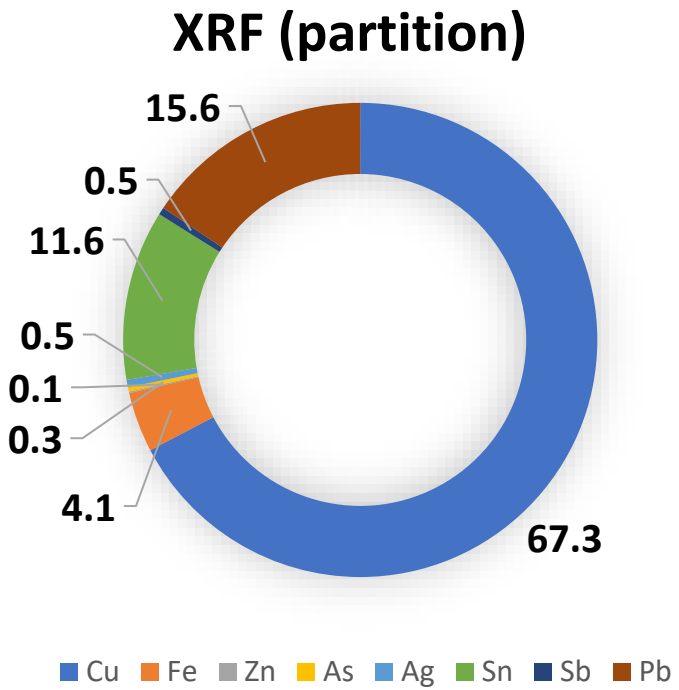


V_{all} = 1.08 cm^3
$V_{corros.}$ = 0.29 cm^3
(27.1%)

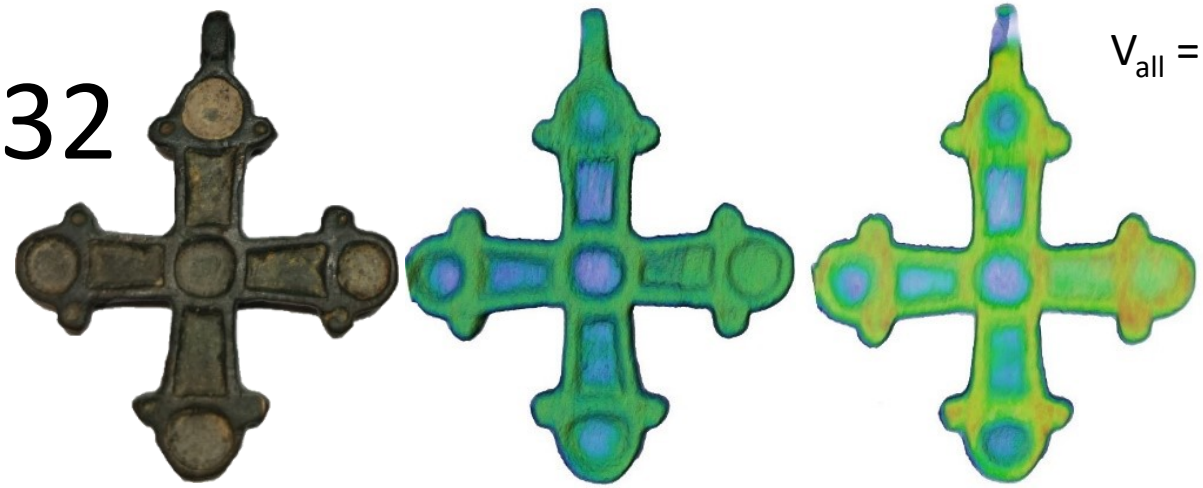




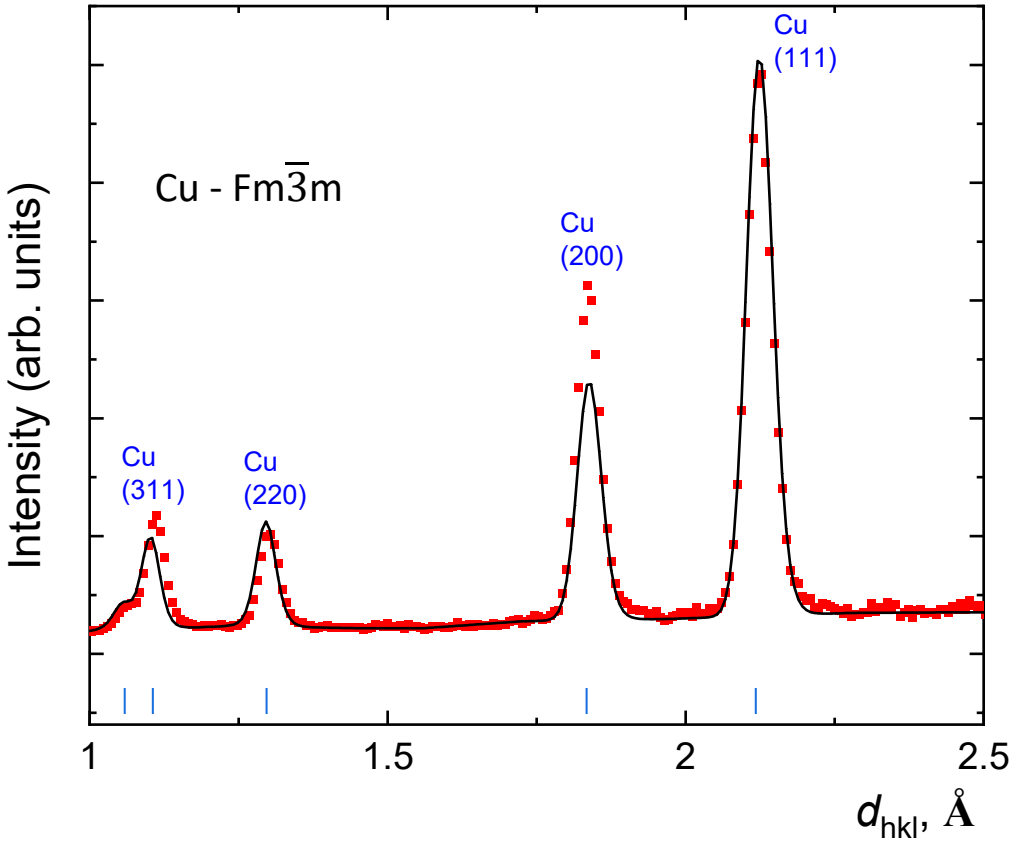


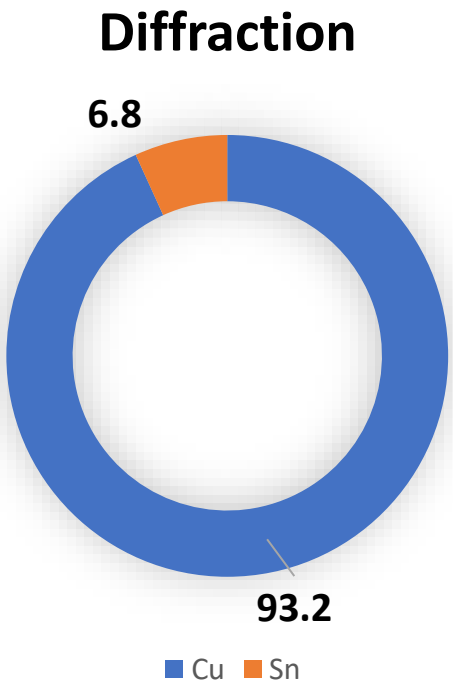


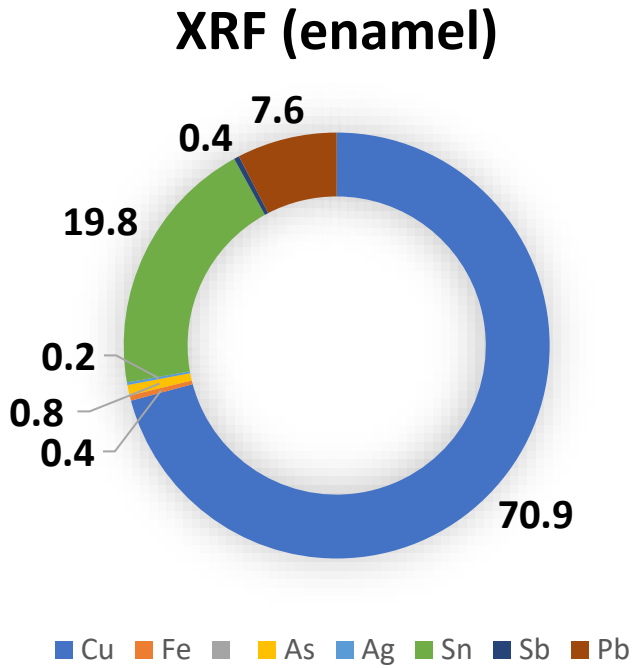
№1432

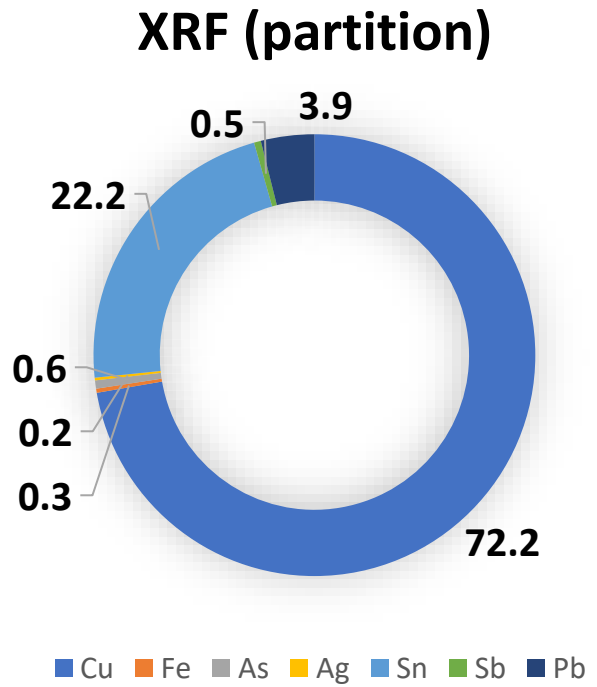


V_{all} = 0.89 cm^3

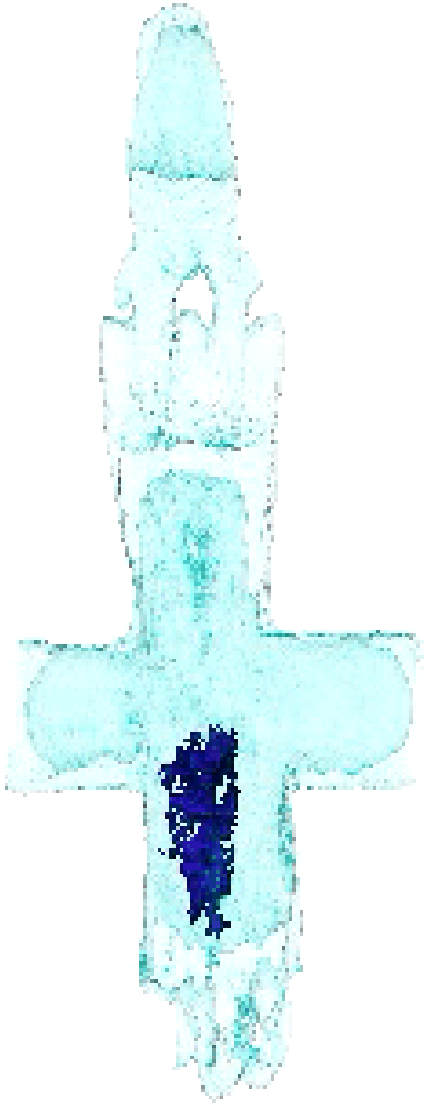








RESULTS



NEUTRON DIFFRACTION RESULTS

Sample	Bronze, %	Cu_2O, %	Pb, %	SiO_2, %	Sn in bronze, %
1431	81.79	-	7.82	10.39	4.99
1628	73.32	19.29	7.40	-	4.09
1432	100.00	-	-	-	6.84
1629	76.26	23.74	-	-	3.78

NEUTRON TOMOGRAPHY RESULTS

Sample	Volume (all), cm^3	Corrosion, cm^3	Internal material, cm^3
1431	1.74	-	**0.006**
1628	1.13	0.19 (16.8%)	-
1432	0.89	-	-
1629	1.08	0.29 (27.1%)	-

X-RAY FLUORESCENCE ANALISYS RESULTS

Sample	Cu, c/%	Fe, c/%	Zn, c/%	As, c/%	Ag, c/%	Sn, c/%	Sb, c/%	Pb, c/%
1431	63.82	2.58	0.97	1.14	0.25	10.38	0.52	20.34
1628	41.74	1.65	7.72	1.62	0.41	15.39	0.79	31.09
1432: partition	72.22	0.32	-	0.64	0.19	22.25	0.51	3.87
1432: enamel	70.98	0.39	-	0.84	0.18	19.84	0.42	7.64
1629: partition	67.28	4.01	0.14	0.31	0.54	11.61	0.49	15.62
1629: enamel	5.09	3.58	0.07	2.76	-	7.40	0.22	**80.88**

THANK YOU FOR ATTENTION!