

An IBA multivariate-driven provenance investigation of ancient lapis lazuli amulets from the Museo Egizio (Turin, Italy)

EPJ+

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μ-PIXE results of pyrite crystals analysis in the Egyptian amulets

μ-PIXE pyrite data of the Egyptian amulets acquired at the New AGLAE facility. Concentration values and associated errors are reported, together with the relative limit of detection (LOD). K=concentration obtained from the analysis of the K line X-ray peak. L=concentration obtained from the analysis of the L line X-ray peak. - = element cannot be detected.

Sample	Area	NaK			MgK			AlK			SiK		
		conc (ppm)	err (ppm)	LOD (ppm)	conc (ppm)	err (ppm)	LOD (ppm)	conc (ppm)	err (ppm)	LOD (ppm)	conc (ppm)	err (ppm)	LOD (ppm)
1182	P1	2000	3000	6000	2000	2000	2000	6000	1000	1000	20000	1000	600
1182	P2	6000	2000	3000	3300	800	1000	3600	500	600	14500	600	300
3038	P1	5000	2000	4000	1000	900	2000	2900	700	900	7700	600	700
3038	P2	5000	2000	3000	2600	700	1000	4100	500	600	12600	600	400
3038	P3	2000	1000	3000	100	600	1000	1600	400	600	4500	300	400
1296	P1	16000	2000	2000	6600	700	700	13600	600	400	25000	600	300
1296	P2	23000	3000	2000	8000	1000	1000	15000	1000	600	37600	1200	400
1296	P3	12000	5000	4000	8000	2000	2000	20000	2000	2000	43000	2000	1000
1301	P1	16000	3000	3000	3000	1000	1000	6800	800	900	11500	700	500
6899	P1	4000	2000	3000	2100	600	1000	1100	400	600	7500	400	400
6899	P2	6000	3000	3000	1400	1000	2000	8400	800	800	14400	700	600
18205	P1	11000	2000	2000	3600	600	800	2400	400	600	9500	400	300
18205	P2	8000	2000	3000	3300	800	1000	2000	500	700	10400	500	400
Sample	Area	P K			S K			ClK			K K		
		conc (ppm)	err (ppm)	LOD (ppm)	conc (ppm)	err (ppm)	LOD (ppm)	conc (ppm)	err (ppm)	LOD (ppm)	conc (ppm)	err (ppm)	LOD (ppm)
1182	P1	1900	800	900	397000	7000	1000	4000	1000	1000	2700	200	300

1182	P2	1000	400	600	421000	3000	200	1800	600	1000	1700	100	200
3038	P1	-	-	1000	448000	4000	500	1200	700	1000	2600	200	200
3038	P2	-	-	800	429000	3000	300	2400	600	900	1800	100	100
3038	P3	-	-	700	485000	3000	200	-	-	2000	2400	100	100
1296	P1	-	-	800	431000	3000	400	2200	500	800	4000	100	200
1296	P2	2400	600	700	366000	4000	400	2000	700	1000	4100	200	300
1296	P3	100	800	1000	392000	5000	1000	-	-	4000	4300	300	400
1301	P1	-	-	1000	463000	4000	500	-	-	2000	1000	100	200
6899	P1	400	300	600	490000	3000	300	-	-	2000	1000	100	100
6899	P2	1100	500	800	489000	4000	300	7000	1000	2000	3600	300	200
18205	P1	2600	400	500	449000	3000	300	1500	500	800	1600	100	200
18205	P2	1600	400	600	446000	3000	300	3300	600	900	1200	100	300
		CaK			TiK			V K			CrK		
Sample	Area	conc (ppm)	err (ppm)	LOD (ppm)	conc (ppm)	err (ppm)	LOD (ppm)	conc (ppm)	err (ppm)	LOD (ppm)	conc (ppm)	err (ppm)	LOD (ppm)
1182	P1	10500	200	800	390	70	800	-	-	500	-	-	500
1182	P2	4800	100	200	110	30	300	35	19	200	23	17	200
3038	P1	5300	100	100	30	50	100	40	30	50	-	-	50
3038	P2	4260	90	80	180	60	80	40	20	40	8	18	40
3038	P3	4820	80	60	130	30	70	6	17	30	14	15	30
1296	P1	6000	100	200	370	30	200	20	16	100	19	13	200
1296	P2	9500	200	300	560	50	300	-	-	300	10	20	300
1296	P3	22300	300	600	570	90	700	70	50	400	30	40	400
1301	P1	6300	100	400	140	50	300	-	-	300	-	-	400
6899	P1	4800	100	90	250	40	80	-	-	70	-	-	60
6899	P2	15400	300	200	470	80	100	-	-	100	90	40	60
18205	P1	6200	100	100	150	30	200	106	17	100	-	-	200
18205	P2	5100	100	200	640	40	300	120	20	300	-	-	100
		MnK			FeK			CoK			NiK		
Sample	Area	conc (ppm)	err (ppm)	LOD (ppm)	conc (ppm)	err (ppm)	LOD (ppm)	conc (ppm)	err (ppm)	LOD (ppm)	conc (ppm)	err (ppm)	LOD (ppm)
1182	P1	-	-	300	497000	2000	1000	1200	200	4000	860	70	800
1182	P2	-	-	200	507000	3000	100	-	-	5000	850	40	400
3038	P1	-	-	80	496000	2000	70	900	200	2000	660	60	80
3038	P2	-	-	60	504000	2000	100	300	200	2000	780	50	60
3038	P3	-	-	50	486000	1000	70	900	100	1000	760	40	40
1296	P1	-	-	100	435000	1000	300	600	100	2000	340	20	200
1296	P2	60	30	200	441000	2000	800	600	200	3000	340	40	400
1296	P3	120	40	500	393000	2000	1000	700	200	4000	350	60	1000
1301	P1	-	-	400	445000	2000	300	1000	100	3000	580	40	400
6899	P1	-	-	60	469000	3000	30	1300	200	1000	480	40	70
6899	P2	-	-	100	421000	4000	200	1800	200	1000	560	80	100
18205	P1	-	-	200	480000	1000	500	500	100	2000	640	30	200
18205	P2	-	-	200	488000	2000	600	700	100	3000	770	40	300
		CuK			ZnK			GaK			AsK		

Sample	Area	<i>conc</i> (ppm)	<i>err</i> (ppm)	<i>LOD</i> (ppm)	<i>conc</i> (ppm)	<i>err</i> (ppm)	<i>LOD</i> (ppm)	<i>conc</i> (ppm)	<i>err</i> (ppm)	<i>LOD</i> (ppm)	<i>conc</i> (ppm)	<i>err</i> (ppm)	<i>LOD</i> (ppm)
1182	P1	120	40	700	150	40	3000	-	-	3000	300	200	1000
1182	P2	70	20	200	290	30	2000	20	17	900	380	70	400
3038	P1	140	30	40	200	40	50	20	20	40	200	100	60
3038	P2	200	30	40	230	30	40	21	19	30	380	90	40
3038	P3	91	19	30	100	20	30	30	15	20	160	60	40
1296	P1	328	17	200	212	19	700	12	11	300	120	50	300
1296	P2	460	30	400	150	30	900	10	19	1000	200	100	700
1296	P3	550	50	1000	500	60	3000	10	30	2000	-	-	2000
1301	P1	114	24	600	1180	50	1000	41	19	600	90	90	700
6899	P1	10	20	40	80	30	30	39	19	30	100	80	50
6899	P2	-	-	100	140	50	60	-	-	90	200	200	100
18205	P1	110	20	100	480	20	800	17	13	500	510	60	300
18205	P2	170	20	300	240	30	800	-	-	500	370	70	600
		SrK			Ba L			Pb L					
Sample	Area	<i>conc</i> (ppm)	<i>err</i> (ppm)	<i>LOD</i> (ppm)	<i>conc</i> (ppm)	<i>err</i> (ppm)	<i>LOD</i> (ppm)	<i>conc</i> (ppm)	<i>err</i> (ppm)	<i>LOD</i> (ppm)			
1182	P1	-	-	3000	100	200	4000	400	500	6000			
1182	P2	-	-	1000	100	100	1000	-	-	2000			
3038	P1	-	-	1000	400	200	300	-	-	9000			
3038	P2	-	-	900	100	100	300	-	-	8000			
3038	P3	-	-	700	300	100	200	-	-	7000			
1296	P1	-	-	500	530	90	900	-	-	1000			
1296	P2	-	-	2000	300	100	2000	-	-	3000			
1296	P3	400	300	4000	1900	300	6000	-	-	8000			
1301	P1	-	-	2000	200	100	2000	-	-	3000			
6899	P1	-	-	800	-	-	300	-	-	7000			
6899	P2	50	300	800	-	-	600	-	-	8000			
18205	P1	-	-	1000	280	90	1000	-	-	1000			
18205	P2	-	-	1000	-	-	1000	-	-	2000			