

Gold enrichment in Staffordshire Hoard K513: results of SEM-EDX analysis

Object Type Mount  
Date 600-635

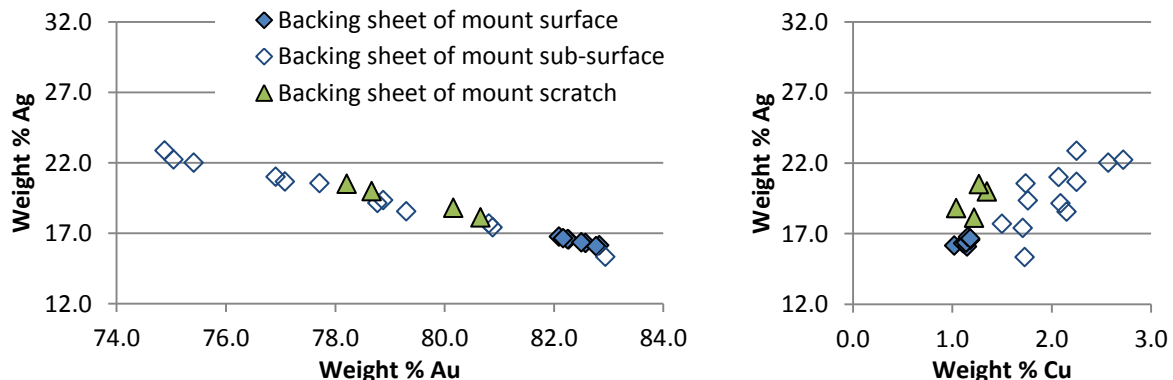
Decoration Filigree  Glass   
Garnet  Other



SEM-EDX analysis was undertaken on a range of components, including the main backing sheet to which the panels and garnet cell walls were attached, the backing sheet of the filigree panel, the filigree wire and the panel cell wall.

Area analysed	No of analyses		Wt% Au	Wt% Ag	Wt% Cu
Backing sheet of mount surface	8	Average	82.5	16.4	1.1
		Standard Deviation	0.28	0.24	0.05
Backing sheet of mount sub-surface	12	Average	78.3	19.7	2.0
		Standard Deviation	2.53	2.24	0.37
Backing sheet of mount scratch	4	Average	79.4	19.4	1.2
		Standard Deviation	1.17	1.09	0.13
Backing sheet of panel surface	8	Average	75.8	22.8	1.4
		Standard Deviation	2.63	2.31	0.42
Backing sheet of panel sub-surface	10	Average	65.3	32.1	2.6
		Standard Deviation	3.09	2.87	0.32
Panel filigree wire surface	12	Average	72.2	25.7	2.1
		Standard Deviation	0.90	1.06	0.34
Panel filigree wire sub-surface	12	Average	73.6	24.3	2.1
		Standard Deviation	2.85	2.87	0.05
Cell wall of panel surface	8	Average	70.6	26.6	2.8
		Standard Deviation	1.09	1.16	0.27
Cell wall of panel sub-surface	15	Average	70.1	27.3	2.6
		Standard Deviation	2.28	2.16	0.27

SEM-EDX surface and sub-surface compositions for each component analysed (the results are normalised). This analysis was carried out as part of the gold enrichment study. For full details of methodology and associated results see report PR07444-10 and PR07444-15



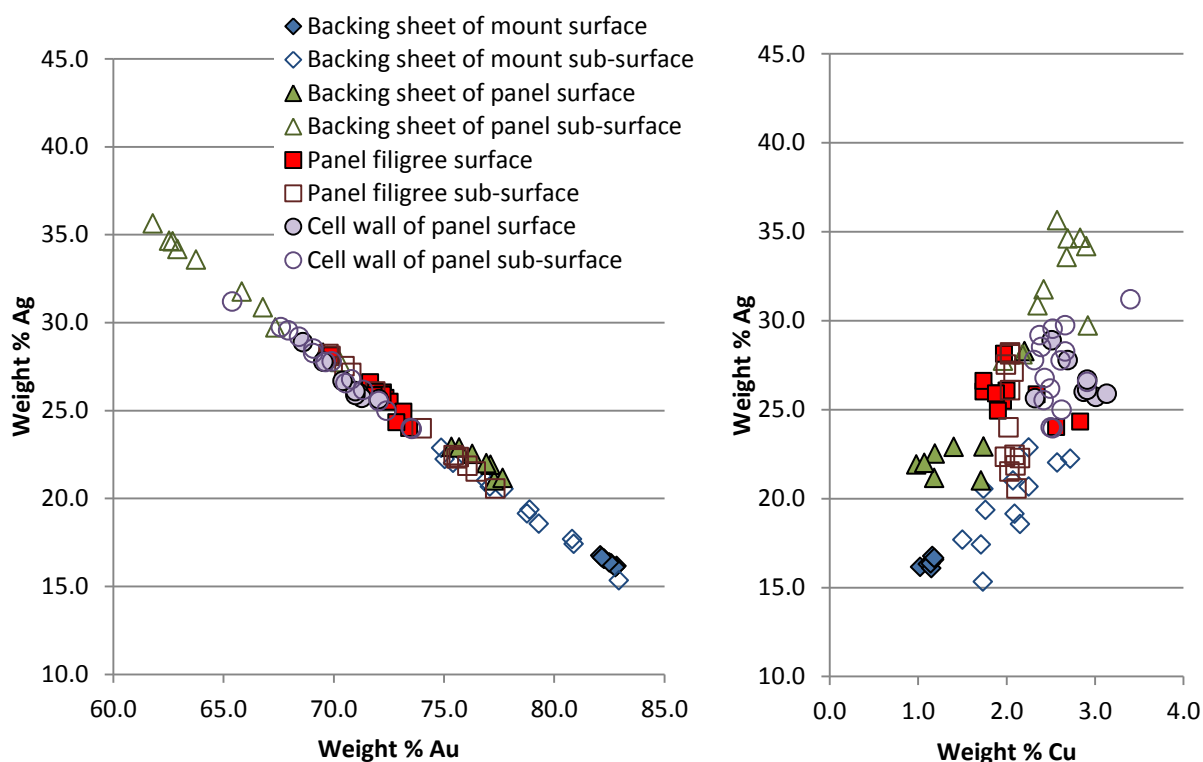
Plots of gold vs silver and copper vs silver contents, based on SEM-EDX analysis, showing the differences between the sub-surface and surface analyses of the backing sheet.

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The analysis of the back of this mount revealed a c.3.3 wt% loss of silver from the surface (a difference of c.17% from surface to core), which is indicative of treatment to deliberately enrich the gold colour of the metal. Only copper and small amounts of silver are normally lost from the surface during burial. The surface of the scratch had a similar composition to the subsurface, but with a similar loss in copper to the other surface analyses, most likely due to corrosion, confirming that the treatment was carried out prior to burial.

The analysis of the back of the panel revealed a c.9.2 wt% loss of silver from the surface (a difference of c.29% from surface to core), which is indicative of treatment to deliberately enrich the gold colour of the metal. Only copper and small amounts of silver are normally lost from the surface during burial.

The cell wall surrounding the panel had a c.0.7 wt% loss of silver from the surface and a difference of less than 5% from surface to core, most likely indicative of corrosion that can occur during burial which results in natural surface enrichment but could also be the result of some deliberate surface treatment. The analysis of the wire revealed a small loss of copper at the surface and a small increase in silver at the surface which may be due to solder or from close contact to corroding silver objects in the burial environment.



Plots of gold vs silver and copper vs silver contents, based on SEM-EDX analysis, showing the differences between the sub-surface and surface analyses of each component analysed.

Comparison of the sub-surface compositions of the cell wall and filigree wire suggests that they were made with the same, or a similar, gold alloy. The backing sheets on the other hand appear to be a distinctive composition, and are therefore a different gold alloy.

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Analysed October 2013

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