

Preliminary Synchrotron Analysis of Peruvian Mummy Hair

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Introduction

Advanced analytical techniques are important for the insightful evaluation of archaeological artefacts [1]. Synchrotron radiation analysis is an especially powerful technique because of its high spatial resolution and low detection limits. It is well-suited to small samples, such as individual human hairs [2], which are easy to collect and robust in the environment.

This work describes a preliminary analysis of dark and blond hairs collected by Nelson from a single Peruvian mummy. The simple aim was to study the distribution of metals during a transverse scan of individual hair samples.

Methods and Materials

The unwashed hair samples — one blonde, the second dark — obtained from a single individual were scanned for x-ray fluorescence from Ca, Ni, Cu, Zn, Pb, Cr, Fe, and Mn by using a $4 \times 6\text{-}\mu\text{m}$ spot at the PNC-CAT beamline at the APS.

Results and Discussion

Only the results obtained for Fe are reported. Figure 1 shows the signal from blonde hair obtained during the transverse scan, while Fig. 2 is that from the dark hair. Although this work is incomplete, it does show that the dark hair Fe is confined almost exclusively to the hair

surface and that the blonde hair Fe is more concentrated in the interior.

The results help demonstrate the effectiveness of synchrotron radiation analysis. While it is tempting to suggest that the differences observed are the result of artificial coloring, it is more likely that hair damage and/or aging was responsible for the different metal distribution.

Acknowledgments

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References

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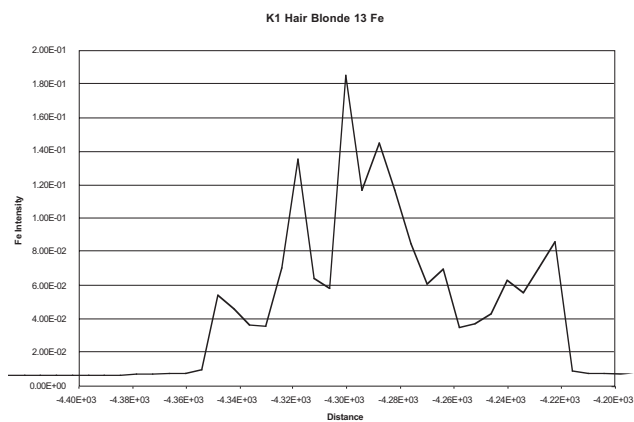


FIG. 1. Fe signal from blonde hair.

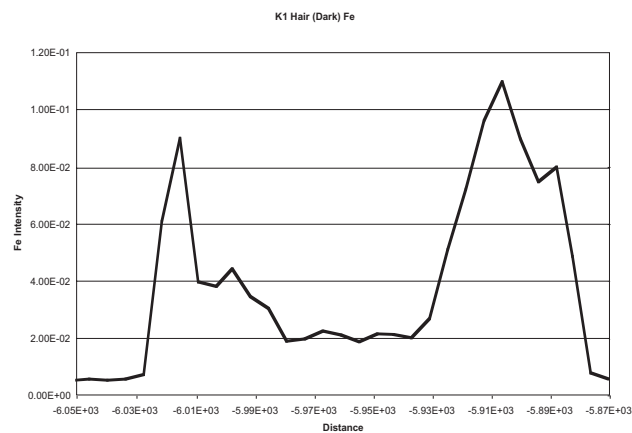


FIG. 2. Fe signal from dark hair.