Microstructure of galena (PbS) in cosmetics of Ancient Egypt

T. Ungár, P. Martinetto, G. Ribárik, E. Dooryhée, Ph. Walter, M. Anne:
"Revealing the powdering methods of black makeup in Ancient Egypt by fitting microstructure based Fourier coefficients to whole x-ray diffraction profiles of galena, Journal of Applied Physics, 91. 2455-2465 (2002)
XRD peak profile analysis

- XRD measurements on a number of geological PbS compounds after thermal/mechanical treatments

- Modeling the XRD peak profile with microstructure parameters (crystallite size, size distribution and shape, internal lattice strain)

- Compare with archaeological specimens

- Deduce the preparation process: crushing, sieving, rolling, hammering, annealing,…

High resolution (low instrumental contribution) required
XRD profile analysis of PbS in cosmetic powders
Middle- and New-Kingdoms of Egypt 2000 years B.C.

1) gentle crushing : E14455
2) gentle crushing and sieving : E23105
3) crushing : N1332
4) crushing and sieving : E11047, N811d and N811g
5) crushing and heating (200 – 300 °C) : E23100 and E21562
internal defects/strain and grain size are the fingerprint of the technological processes involved in the preparation of the powder (crushing, sieving, heating)

Galena-based cosmetic: bright powder or fine-grained (dust-like)