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Anton Beran, Institut für Mineralogie & Kristallographie, Universität Wien
Geozentrum, Althanstraße 14, A-1090 Wien
Richard Tessadri, Institut für Mineralogie & Petrographie, Universität Innsbruck
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Abstracts

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ELECTRON MICROPROBE DATA ON ROŞIA MONTANĂ (APUSENI MOUNTAINS) GOLD: TOWARDS A DATABASE FOR IDENTIFYING ANCIENT ARTEFACTS

Pop, D.[1], Ionescu, C.[2], Benea, M.[2], Tămaş, C.[2] & Forray, F.[2]

[1]Museum of Mineralogy, Babeş–Bolyai University, 1 Kogălniceanu Str., RO-400084, Cluj-Napoca, Romania
[2]Department of Mineralogy, Babeş–Bolyai University, 1 Kogălniceanu Str., RO-400084, Cluj-Napoca, Romania
e-mail: danapop@bioge.ubbcluj.ro

According to historical records, gold mining in the Apuseni Mountains spans over more than 3000 years; in the case of Roşia Montană (in antiquity known as *Alburnus Maior*), there is archaeological evidence of at least 2000 years of gold mining (*e.g.* CAUUET et al., 2003) by Dacians followed by Romans (106–273 AD). This gold ore deposit can be therefore considered as a major potential gold source for ancient populations. In order to achieve reliable correlations between archaeological gold artefacts and potential sources, detailed studies are needed for defining their mineralogical and chemical compositions.

This study represents a first step in the complex chemical characterization of the Roşia Montană gold, on samples from the valuable collection of the Museum of Mineralogy, Babeş–Bolyai University of Cluj-Napoca (POP et al., 2004). Electron Microprobe (EMP) analyses were carried out on ultrasonically-cleaned gold samples subsequently embedded in resin, at 25 kV accelerating voltage, 20 nA beam current intensity and 5 μm electron beam diameter, with a Jeol XA 8600 unit (Salzburg University). Based on the EMP results, two Au-Ag alloys could be identified in the Roşia Montană samples: gold, $Au_{0.67}Ag_{0.33}$ (dark yellow) and electrum, $Ag_{0.61}$ $Au_{0.39}$ (light yellow). Au and Ag show a strong inverse correlation ($r = –0.99$). Te concentrations are higher (between 0.15 and 0.35%) in electrum as compared to gold (< 0.13%). A similar relationship exists between Au and Cu, but at much lower Cu concentrations (< 0.06%).

As preliminary conclusions, we may state that the investigated gold samples from Roşia Montană show mineralogical and chemical variability at the ore deposit scale. Regarding the whole Apuseni Mountains area, an even more complex (geo)chemical heterogeneity is to be expected. The chemical correlation of Au-Ag may point to particular mineralogical-compositional relationships that may give a clue in further geochemical correlations. EMP proved to be more suitable for deciphering detailed genetic mechanisms at micrometer scale than other analytical methods (micro-PIXE or micro-SR-XRF) previously used in gold provenance studies. Consistent chemical information on gold ore deposits and archaeological gold artefacts from Romania would contribute to the establishment of a provenance database at regional and European scale.

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