

Breakdown structures of synthetic solid solutions in the system Cu–Fe–Au–S

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The sulfides of Cu and Fe were synthesized using salt-flux method at 650–700 °C in the presence of excess Au. The following sulfides were found in the products of the experiments: i) phases whose composition falls within the bornite field (Cu_2S – Cu_5FeS_4), ii) chalcopyrite (CuFeS_2), iii) sulfides with composition close to nukundamite ($\text{Cu}_{3,4}\text{FeS}_4$), idaite ($\text{Cu}_{5,5}\text{FeS}_{6,5}$), and covellite (CuS). In bornite Au exists as a phase that forms lamellae that are typical for decomposition (substitution) structures, but in nukundamite (idaite) it forms segregations of copper gold or a phase with composition close to CuAuS . In the run products this phase exists in the form of small homogeneous “fresh” grains, or forms heterogeneous “worm-like” aggregates.

Key words: sulfides, bornite, chalcopyrite, gold, syntheses, salt-flux

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