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Abstract:

The Far-Southeast porphyry Cu-Au deposit, northern Luzon, Philippines, is hosted within the Imbanguila diorite – dacite intrusion complex and formed at 1.3-1.4 Ma, making this one of the youngest porphyry deposits in the world. Far Southeast Gold Resources Inc, a joint venture of Lepanto Consolidated Mining Company and Gold Fields Ltd, recently completed 102 km of underground drilling and confirmed a resource of 892 Mt at 0.7 g/t Au and 0.5 wt% Cu. Previous studies identified native gold as blebs in sulphides, and also proposed the presence of gold microinclusions in sulfides. The present study focused on gold deportment using microscopy, SEM with EDS, and LA-ICP-MS. Bornite, chalcopyrite, pyrite, covellite and chalcocite (the latter two replacing bornite) were analyzed in samples that ranged in depth from ~1100 to 1550 m below surface. Gold occurs in or on the margins of sulphides as blebs (<10 um) of native gold (with ~8-15 wt% Ag), krennerite (Au₃AgTe₈) and petzite (Ag₃AuTe₂). LA-ICP-MS analyses of 28 points on sulphide grains that are free of mineral inclusions under SEM indicate that bornite has the highest Au content (≤8 ppm) in its crystal structure; Au in other sulphide minerals is <1 ppm. Locally high Au spikes in bornite are due to micro-inclusions (<1 um), mainly Au tellurides; Te is <1-58 ppm in the crystal structure (i.e., without a discernable phase) and correlates with Au content. High values of Bi (≤ 2160 ppm), Se (≤ 680 ppm) and Pb (≤ 1270 ppm) in bornite tend to correlate; high values of Bi (≤ 482 ppm) and Se (≤685 ppm) in covellite are associated with Pb (≤4 ppm). High Se (133-560 ppm) and Bi (147-5680 ppm) in bornite correlates with high Ag (70-180 ppm). Values of >550 ppm Se and Pb each in sulphides are due to micrometre-size inclusions of clausthalite (PbSe). Sn in bornite is <1 to 22 ppm and in covellite is ≤90 ppm; all sulphides contain <2 ppm Mo and As. We conclude that blebs of native gold and Au tellurides (most ≤10 um to inclusions <1 um in size) are responsible for much of the Au in the deposit.

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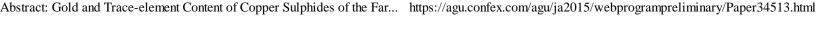
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