

Trace metals distribution in pyrite from the Iberian Pyrite Belt

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The Iberian Pyrite Belt (IPB), in southwestern Iberian Peninsula, is the Earth's largest cluster of volcanogenic massive sulfides (VMS), including polymetallic, cupriferous and pyritic ores hosted by both black shales and volcanoclastic rocks. Pyrite dominates the mineral assemblages in these deposits and it is frequently accompanied by sphalerite, galena and chalcopyrite, as well as a suite of less frequent minerals including arsenopyrite, tetrahedrite–tennantite, cobaltite, Sb–As–Pb–Bi sulfosalts, gold and electrum. There is a clear link between the texture of pyrite and the geochemistry of trace elements. Primary colloform-textured pyrites (Py-1) from massive lenses consist of concentric layers of pyrite with kernels of pyrite framboids concentrates As, Pb, Zn and Sb as determined by LA-ICP-MS. However, pyrites from massive lenses affected by refining processed as a result of heating promoted by intrusive rocks exhibit perfectly well developed external facets that may contain (Py-2) or not (Py-3) spongy-looking cores. Single spot and mapping acquired by LA-ICP-MS shows that the latter pyrites contain Cu, Ag, Co and Ni. These elements occur mainly as nano-to-micron-sized particles of tetrahedrite-tennantite, chalcopyrite, galena, gersdorffite and native Au, all of them showing dissolution-replacement textures. HRTEM inspection of the aforementioned pyrites indicate that trace elements may be in both solid solution and as nano-sized trace element particles (e.g., galena, tetrahedrite, arsenopyrite and gold), which may have been precipitated from both hydrothermal solutions and polymetallic entrained in them.