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The Iberian Pyrite Belt as a Strategic Source of Cobalt

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Cobalt is one of the critical elements for the energy transition. It is an essential component of the lithium-ion batteries used in most laptops, mobile phones, and electric vehicles. Cobalt is used in many different sectors, ranging from chemical, metal and industry, and electronics to healthcare.

In recent years, the demand for cobalt has escalated while the global supply chain for this element is still unstable. That is why it is imperative to look for new sources of this element that will help satisfy the demand of the industry.

The Iberian Pyrite Belt (IPB) is the largest concentration of volcanogenic massive sulphide deposits worldwide. Our compilation indicates that several world-class orebodies host large volumes with whole-rock cobalt values greater than 300 ppm. However, this information is very scattered, scarce, and poorly contrasted. This study improves our knowledge on where the Co grades are located at deposit scale, where cobalt is preferentially concentrated (shale-hosted vs. volcanic-hosted deposits and different zones of the massive sulfide vs. stockwork), and in which phases and how it occurs—if it is as discrete phases, nanoinclusions, or solid solution in other phases, very likely pyrite.

The large deposits of Tharsis (shale-hosted), Concepción (volcanic-hosted), and Valverde (shale- and volcanic-hosted) show an average content of 400 to 500 ppm with metre-thick intersections of up to 0.2 wt % Co. pXRF, EPMA, and LA ICPMS analyses of pyrite show that the highest contents are located in the stockwork zones near the contact with the massive sulphides. Co occurs either as grains of cobaltite, glaucodot, and alloclasite or as stoichiometric substitutions in pyrite, which locally has up to 360 ppm of Co, showing a good correlation with As and Au contents.

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