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SOURCE OF IMPURITIES ASSOCIATED WITH SRI LANKAN VEIN GRAPHITE: IMPLICATION FROM GANGUE MINERALS

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Possession of highly pure and crystalline vein graphite of Sri Lanka is well-known all over the world. Further, purification can increase the demand of vein graphite usage in high tech applications. Hence, proper identification of impurities present in graphite is much important before selecting a suitable method of purification. The occurrence of vein graphite is caused due to the transportation of carbon-bearing hydrothermal fluid through fracture system of a host rock. When this fluid is uplifted, the impure graphite could be formed due to wall rock interaction and impurities incorporated with the hydrothermal fluid. Therefore, this study focuses to identify the source of impurities incorporated with Sri Lankan vein graphite by employing both chemical and petrographical investigations. The graphite samples were collected from Kahatagaha-Kolongaha mine at 1132ft and 2000ft depth levels. Samples were collected as a series from host rock to middle of the graphite veins. They were crushed using a laboratory disk mill and <53 µm size fraction was separated by using a sieve. Thin sections of wall rock and graphite-wall rock boundary were prepared from selected samples for petrography. The carbon percentage was determined according to the ASTM - 561 by weighing the residue method. Moreover, geochemical analysis of the graphite samples was carried out by Inductively Coupled Plasma (ICP) technique followed by aqua regia partial extraction and lithium metaborate/tetraborate fusion. The carbon content of the graphite samples collected from the middle and at both boundaries are 99.08%, 96.29% and 98.01%, respectively, indicating that the purity of graphite decreases from the middle of the vein towards the wall rock. The major gangue minerals found in the samples are pyrite, quartz, chalcopyrite, calcite, dolomite, feldspar, kaolinite and chlorite. Further, petrographical studies show that the wall rocks, which were collected about 5 m away from the graphite veins, contain quartz, feldspar, garnet, biotite and orthopyroxene as major mineral phases while disseminated graphite, zircon, ilmenite and apatite as accessories. In contrast, the graphite-wall rock boundary shows a highly altered zone with the formation of secondary minerals such as biotite, titanite, calcite, pyrite and feldspars. This may be due to the transportation of hydrothermal fluid through the fracture system of the wall rock or mineral grain boundaries. Therefore, this study reveals that the most of the impurities associated with the graphite were derived from the wall rock itself due to the fluid-wall rock interaction and only a minor amount of impurities may have come along with the hydrothermal fluid.

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