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Lithium and Graphite Mineralisation of the Kuldjuktai Mts., Uzbekistan

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Uzbekistan has vast mineral potential and is among the world leaders for production of Au, U, Cu, and base metals. Currently, critical raw materials are extracted incidentally as by-products or by small-scale mining. The territory of Uzbekistan is located at the junction of three continental blocks (Kazakhstan, Afghan-Karakum, and Ustyurt), separated by a fold-thrust belt formed at the closure site between Turkestan and Zeravshan oceans. Here we assess metallogeny of the Kuldjuktai Mts., which are the westernmost spur of the Zeravshan Ridge.

Dominant mineralisation types include gold, rare metals (Li), graphite. Rare metal (Li) mineralisation is linked to pegmatite and aplite veins. The Aktosty lithium occurrence is associated with lepidolite-spodumene pegmatites cutting through the gabbroids of the Shaidaraz intrusion. The Aktosty-Shaidaraz pegmatite field stretches SE-NW for 6 km. There are two mineralogical types of pegmatite bodies: oligoclase-microcline-tourmaline (predominant) and quartz-feldspar-lepidolite-spodumene. Analyses of lepidolite samples showed following concentrations (%): Li₂O – 1.95; Rb₂O – 1.0; Cs₂O – 0.094; Ta₂O₅ – 0.006; Nb₂O₅ – 0.014. The Taskazgan graphite deposit is represented by gabbro, norites, harzburgites, and peridotites. Along the contact of gabbroids with host limestones, a 10- to 15-m-thick graphite-bearing melange zone develops. Drilling has established that the gabbro massif can be traced to a 500 m depth. Graphitisation is superimposed due to carbon-containing (CO₂ and CH₄) mantle fluids penetrating along deep fault zones and depositing in favourable structures. The carbon isotopic composition of carbonized gabbro ($\delta C^{13} = -16.39\text{‰}$) indicates mantle origin.

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