

## **APPLICATION OF ORE MICROSCOPY, SEM-EDX AND QEMSCAN TECHNIQUES FOR STUDY OF GOLD AND BASE METALS OF LADAKH ISLAND ARC, GILGIT-BALTISTAN, PAKISTAN**

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### **Abstract**

The Kohistan-Ladakh Island arc, present between the Indian and Eurasian plates, represents a very diverse geological setting with fascinating exposures of plutonic and volcanic rocks. The island arc setting is well known for economic minerals potential throughout the world. Advanced level geochemical, remote sensing and spectroscopic techniques were utilized to explore the economic gold deposits of Astor, Machulu and Ranthak areas of the Ladakh Island Arc. Mineralized and sulfide bearing altered rock samples were analyzed using ore microscopy, SEM-EDX, QEMSCAN and atomic absorption spectrophotometer techniques. All the bulk samples have variable quantities of gold, silver and base metals as evident by bulk sample analysis for gold, silver and base metals concentration. The ore microscopy and SEM-EDX study of Astor area reflects copper and lead mineralization with economic concentration of Au in lattice structure of Cu and Pb bearing phases associated with quartz veins and their alteration products. QEMSCAN results also confirm association of economic gold with chalcopyrite, galena, quartz and their altered products. Among all the study areas, the Astor area have promising results of gold and base metals concentration within chalcopyrite and galena rich mineralized quartz veins. These mineralized veins are few meters to 10 m wide with exposure at few places. The enrichment and depletion of different types of minerals and oxygen isotopic study of Astor area suggests that the magmatic hydrothermal fluids played a key role in copper and lead mineralization with gold concentration. On the contrary, concentrations of gold, silver and base metals were much lower in samples analyzed from Machulu and Ranthak areas. The enrichment and depletion study of ore minerals in these samples evinces association with sulfide bearing altered zones in shear zones. Further detailed investigation is recommended to evaluate economic feasibility of these sites and to locate more mineralization zones.