

SEG 2022 Conference: Minerals For Our Future

Geological Characterization of Auriferous Sulfide Within the Vempalle Dolostone, Cuddapah Supergroup, Southern India: Implication for Carlin Like Gold Occurrence

Ramesh C. Behera, Sahendra Singh, Anmol Barla

INDIAN INSTITUTE OF TECHNOLOGY(INDIAN SCHOOL OF MINES) DHANBAD, DHANBAD, JH, India

The Earth's mineral resources are limited in a world of ever-increasing demand from commerce and technology. As a result, new frontiers in mining metals and energy resources are necessary for future economic and technological advancement. Nanotechnology and relevant industrialization appear to be high on humanity's development agenda.

The study area for the present work belongs to the Vempalle Formation within the Cuddapah Supergroup in southern India. The dolostone within the Vempalle Formation is well known for its uranium mineralization. However, our preliminary work also shows the presence of auriferous sulfides within the uraniumiferous dolostone. Gold within the formation is associated with pyrites and arsenopyrites. Petrographic study reveals several types of pyrite, i.e., diagenetic, hydrothermal, and framboidal aggregate types. The gold values within these sulfides range from 10 to 1500 ppm. Arsenic zoning within the pyrite crystal indicated the transportation from earlier diagenetic pyrite and precipitated onto the later euhedral hydrothermal ones. Major oxide co-relation indicates the typical detrital origin. Major and trace elements systematics suggest the anoxic depositional environment of the mineralized dolostone. The Pb value indicates the biogenic activities which provided the anoxic environment for sulfide enrichment. The negative Eu anomaly from the REE plot means the host dolostone is recycled from the upper continental crust. The Gd/Yb values confirm the post-Archean depositional environment. The Au-rich domains exhibit Au (Sb), (Ti), (Hg), and (Cu) peaks in the energy dispersive X-ray (EDX) spectrum. A positive correlation between Au and As indicates that they are co-precipitated. These observations confirm the presence of invisible gold both as nano inclusions and solid solution within the crystal structure of arsenian pyrite and suggest the Carlin-type of gold occurrence within the Vempalle dolostone of the Cuddapah Supergroup in southern India.