Goldschmidt 2024 Abstract
https://doi.org/10.46427/gold2024.24354

Iron-ore mineralization of Badampahar, Odisha - a part of the Archean Greenstone Belt in the East Indian Shield

ARKODEEP SENGUPTA[1] AND TAPAN KUMAR BAIDYA[2]

[1]Indian Institute of Technology Kharagpur
[2]Jadavpur University
Presenting Author: sengupta.arkodeep@gmail.com

The Badampahar Iron ore deposit within the Gorumahisani-Badampahar belt of the Iron Ore Group (IOG) is a part of the Granite-greenstone terrain of Singhbhum, Odisha, India. The ore is predominantly of Banded Iron Formation (BIF)- type, occurring both as massive ore and as fine laminae, characterized by alternating dark brown and thick grey bands. These grey bands comprising the ore, have a dark brown streak, indicating considerable martitization. In places, it has been converted to haematite as well. Additionally, variable degrees of alteration along planes of weakness such as bedding or along fractures to hydroxides like goethite and lepidocrocite, give the ore a spongy and porous appearance. These factors can elucidate the absence of their strongly magnetic nature. Traces of slickenside lineation within the ore and associated host rocks indicate their proximity to a shear zone. In the field scale, post-depositional deformation can be observed in the form of mild puckers or locally as zones of culmination and depression attributed to fold interference and as micro-faults displacing the laminae. In general, the individual bands have a non-uniform thickness with the silica-rich (chert) bands being thicker compared to the silica-poor (ore) bands along with occasional lateral variation in the form of pinch and swell. Reflected light microscopy of the massive iron ore reveals that they are dominantly martite occurring along with relict magnetite in a goethite matrix. These grains probably owe their origin to late-stage diagenesis or low-grade metamorphism of the iron formation. Magnetite preserved as relict grains show octahedral cleavages along which alteration to haematite has taken place. In micro-scale, the BIF layers appear gradational comprising large-sized elliptical to sub-elliptical grains of the magnetite-rich bands alternating with bands rich in jasper parallel to the schistosity. The nature of the grains points towards a sedimentary origin, metamorphic recrystallisation being inconspicuous. Analysis of the major oxides in the ore samples was carried out using an electron microprobe. The deficiency of TiO_2, NiO and V_2O_3 in the analyzed grains indicates that intermittent volcanism had no role in the formation of the BIF and rather points toward a sedimentary character.

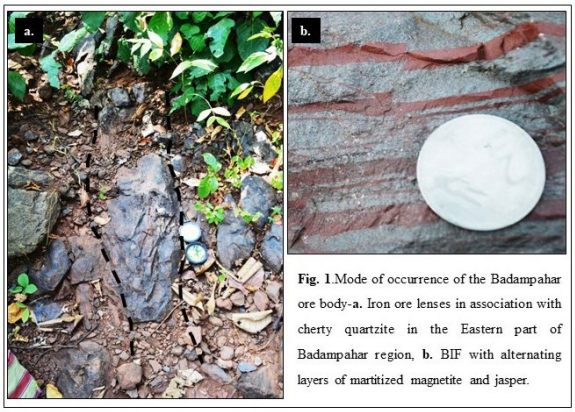

Fig. 1.Mode of occurrence of the Badampahar ore body-**a.** Iron ore lenses in association with cherty quartzite in the Eastern part of Badampahar region, **b.** BIF with alternating layers of martitized magnetite and jasper.

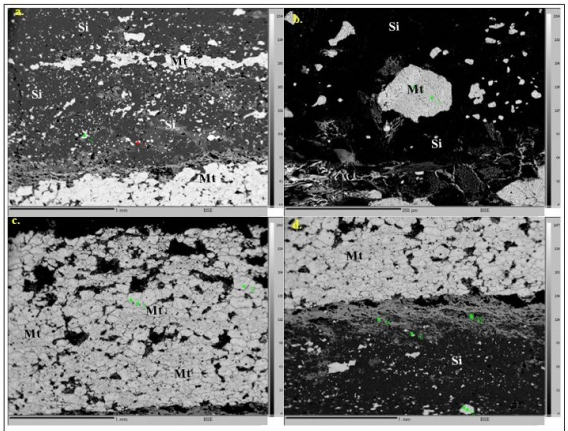

Fig. 2. Backscattered electron image of BIF and iron ore from the Badampahar area showing- **a.** Variation in the thickness of the ore bands, **b.** Partly martitized magnetite, **c.** Granular mosaic of martitized magnetite grains, **d.** Compositional bands with the silicate band showing weak schistosity (**Mt**- Martitized magnetite, **Si**- Cherty Silica).