

In-situ LA-ICP-MS trace element analyses of magnetite: Geochemical Characterization for Algoma type and Superior type Banded Iron Formations

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The major and trace element contents of magnetite from two Superior type BIFs (Huoqiu and Yuanjiacun) and an Algoma type BIF (Yishui) in China were analysed by electron microprobe analysis (EPMA) and laser ablation inductively coupled plasma mass spectrometry (LA-ICP-MS). Using the data obtained in this study together with compiled literature data, we investigated systematic differences in magnetite compositions between Archean Algoma- and Paleoproterozoic Superior-type BIFs in order to understand the role of their genetic conditions on the chemistry of magnetite. The results show that Al, Mn, Ti, V, Ni are more enriched in magnetites from Algoma type BIFs than those of Superior type BIFs. We suggest that the differences are mainly caused by oxygen fugacity, temperature and fluid source. The magnetites from the Algoma-type BIFs are more enriched in trace elements than those from the Superior type because the former originated dominantly from high temperature hydrothermal fluid under low oxygen fugacity conditions while the latter formed mainly from low temperature and relative oxidized sea water.