IN-SITU ANALYSIS OF ALUMINOUS HEMATITES AND GOETHITES BY RAMAN SPECTROSCOPY

RAMANAIDOU, E. R.1 AND VAN BRONSWIJK W. 21 CSIRO Exploration and Mining, Private Bag, PO Wembley, WA 6014, Australia; 2 School of Applied Chemistry, Curtin University of Technology, P.O. Box U1987, Perth, WA 6845, Australia.

The Raman spectra of aluminous hematites and goethites have been studied to establish the distribution of aluminium in individual ore grains and to gain an insight into ore generation processes.Analyses of synthetic aluminous hematite and goethite reveal a good correlation between the Raman spectra and aluminium content. For hematite, the relative intensity of the 670 cm-1 Raman band increased as aluminium incorporation increased and that the relative intensity of the 225 cm-1 band decreased concurrently. For goethite increasing aluminium incorporation was manifested by a decrease in intensity of the 224 cm-1 and 479 cm-1 bands and a shift and broadening of the 390 cm-1 band.Raman spectra of hematite and goethite from Australian iron ores, chemically and mineralogically well characterised, were acquired and compared to those of the synthetic samples. These natural samples were both analysed in powdered form and in thin sections and their Raman spectra provided fast and accurate mineralogical as well as chemical information. Mineralogical Raman maps and electron microprobe chemical maps were combined to provide a complete in situ mineralogical and chemical characterisation of iron ores.Raman spectra of iron oxides and oxy-hydroxides can provide fast and accurate mineralogical information of Australian iron ores critical in understanding ore genesis and grade characterisation. Raman spectra and electron microprobe analysis complement each other in offering micrometer scale mineralogical and chemical information.