

Raman Spectroscopy of Natural Titanomagnetites

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The Raman spectral patterns of analyzed natural titanomagnetite samples revealed peaks at 670-680 cm^{-1} , 544-603 cm^{-1} , 407-495 cm^{-1} and 373-392 cm^{-1} that correspond to the A_{1g} , T_{2g} (2), T_{2g} (3) and E_g vibrational modes of the spinel $Fd3m$ space group. Previous studies of titanomagnetite Raman spectra patterns have suggested the behavior of these peaks reflect the distribution of Fe^{2+} -O, Fe^{3+} -O and Ti^{4+} -O bonds within the titanomagnetite crystal structure. The peak intensities of each vibrational modes are observed to be relative, reflecting the re-distribution of Fe^{2+} and Fe^{3+} in both the tetrahedral and octahedral sites as a function of Ti concentration. Existing titanomagnetite Raman spectroscopy studies are limited to analysis of synthetic titanomagnetite. In this study, Raman spectral patterns from natural titanomagnetite i.e., magnetite-ulvöspinel solid solution samples were analyzed to determine behavior of Raman spectrum peak positions and intensities due to changing content of Ti^{4+} , Fe^{2+} and Fe^{3+} .

Keywords : Raman spectroscopy, Natural titanomagnetite, Ti concentration