Due to the depletion of world lump iron ore stocks, pre-treated agglomerates of fine ores are making up a growing proportion of blast furnace feedstock (around 80%). These agglomerations, or ‘sinters’, have the potential to be quite variable in their composition. However, low temperature sintering (<1300°C) of many hematite-goethite ores, fluxed to a fixed basicity, produces sinters that are reasonably consistent in their mineralogy. Such sinters are generally composed of four main phases: iron oxides (40-70vol%), ferrites (most of which are SFCA, Silico-Ferrite of Calcium and Aluminium, 20-50vol%), glasses (up to 10vol%) and dicalcium silicates (up to 10vol%). Despite the high proportion of SFCA and the importance of its role in sinter, it is yet to be adequately characterized in terms of its chemistry and mineralogy. To date, there has been much work published regarding the fundamental phase relations, which influence the assemblages and textural features normally encountered in iron ore sinters.

However, these works report the results of equilibrium studies, and, whilst important in establishing fundamental platforms for the study of sintering, they are unlikely to reflect conditions operating during industrial sintering processes. Real-time, X-ray diffraction (XRD) experiments have recently been conducted into the formation of SFC (aluminium-free homologue of SFCA). This allows the study of the mechanism of SFC formation and the observation of intermediate phases directly with respect to time and temperature. Application of the Rietveld method for phase quantification also allows the estimation of kinetic data for the mineral phases being studied.

Keywords: (IN SITU) (HIGH TEMPERATURE) (IRON ORE SINTERING)