IMPORATANCE OF BLOATED DROPLETS ON THE REFINING KINETICS OF OXYGEN STEELMAKING

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Steelmaking processes are complex because of the presence of multiple phases, many components, and the non-steady state/non-homogenous conditions within the process. The severe operating conditions make it difficult to take measurements and directly observe the process. Incorporating mathematical modeling with high temperature experimental approach can provide complementary insight in the interpretation of the experimental results and contribute to determining the fundamental phenomena at the root of the observed behaviour. This presentation focuses on development of a mathematical model incorporating internal and external CO gas generation as well as its escape rate from a single droplet under various operating conditions in oxygen steelmaking. The model results are validated against experimental data available in the literature. This work suggests that the kinetics of oxygen steelmaking is dominated by changes in the behaviour of iron droplets in the emulsion during the main blow, in particular, in the early part of the blow when the droplets generated from the impact region "bloat" and remain in the emulsion for relatively long periods.