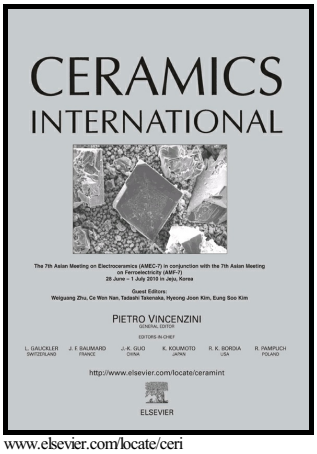

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Corrosion of refractory alumina plates used in the sliding gate system of steelmaking ladle: chemical experiment

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Abstract

The aim of this study is to investigate the corrosion process of the refractory Al_2O_3-ZrO_2–C slide gate plate caused by chemical interactions with secondary refining slag. The plate is part of the steelmaking ladle slide gate system, therefore its lifespan extension and integrity are of concern. *Post mortem* plates with slag adhered on their channel surface were analysed and static cup corrosion test experiments were performed in a controlled atmosphere furnace for 1 hour at 1600°C. The corrosion product phases Gehlenite ($Al_2Ca_2O_7Si$) and Spinel ($MgAl_2O_4$) identified by DRX were formed after the experiment, showing that the slag is able to chemically corrode the Al_2O_3-ZrO_2–C plates. In addition, a comparison of the interface region between the slag and the *post mortem* plate and the interface region between the slag and the static cup corrosion test specimens showed that the corrosion products are swept away by the fluid flow. Even though chemical corrosion by slag has been identified as one of the causes of the plate channel degradation, the study suggests that it acts synergistically with other mechanisms of degradation.

Keywords:

refractory, aluminium oxide, corrosion slag, plate, sliding gate system, secondary metallurgy, static cup corrosion.

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