

Synthesis and Microstructure Observation of Molten Metal Corrosion Resistant Yttria Based Refractory

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When the demand for finding new refractory materials which can sustain molten metal at very high temperature becomes imperative, Y₂Ti₂O₇, the main phase precipitated in oxide dispersion strengthened (ODS) steel, has been considered a promising candidate. In this study, ceramic discs of Y₂Ti₂O₇ were firstly sintered from Y₂O₃ and TiO₂ by solid-state reaction and hot-pressing method, and then densified by Hot-isostatic-pressing (HIP) before being employed to fabricate sandwiched structures with aluminum (Al) foils. The phase identification by X-ray diffraction confirmed no reaction between the molten Al and the ceramics, while the micro-structural observation and energy dispersive X-ray spectroscopy results revealed that the densification has improved the resistance of Y₂Ti₂O₇ ceramics against molten-metal penetration. The result of this study should be good reference data for designing for crucible, casting molds.