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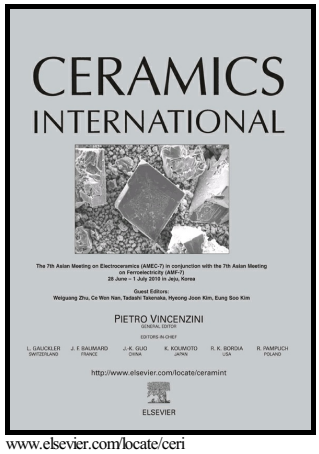

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A study on the wetting behavior of liquid iron on forsterite, mullite, spinel and quasi-corundum substrates

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ABSTRACT

Wetting characteristics of liquid iron on magnesia, alumina and silica mixture substrates were studied by sessile drop experiments. Chromium-free forsterite, mullite, spinel and quasi-corundum phases were selected as alternative refractories in MgO-Al_2O_3-SiO_2. Morphological changes of molten electrolytic iron on the oxide substrates were investigated via apparent contact angle measurements. The results showed that the wetting behavior was significantly influenced by FeO compounds that were formed via oxidation of the liquid iron. Morphologies of the reacted layer were studied by Scanning Electron Microscope (SEM)/EDX analysis. The ternary phases FeO-MgO-SiO_2 and FeO-Al_2O_3-SiO_2 improved the wetting of liquid iron on the forsterite and mullite substrates by providing liquid phases at solid (refractory)–liquid (iron)