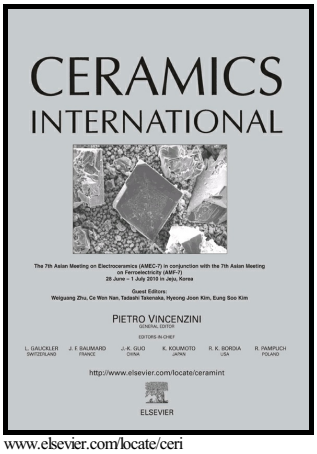

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High-temperature wettability and interactions between NbSi-based alloys and Y_2O_3 ceramics

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Abstract

The high-temperature wettability and interactions between NbSi-based alloys and Y_2O_3 ceramics with various microstructures were studied, based on which the corresponding mechanisms were discussed. The results showed that there was a characteristic transition during the high temperature wetting between the alloys and ceramics when the Y_2O_3 microstructure changed. The rate of spreading of molten NbSi-based alloys on the Y_2O_3 ceramics was relatively high when the level of open porosity was greater than 20.8%. As the level of open porosity of the Y_2O_3 ceramics increased from 6.9% to 27.8%, the initial and equilibrium contact angles between the alloys and ceramics increased from 81.3° to 110.0°, and from 60.5° to 93.2°, respectively. TiO and Ti_2O phases formed within the alloy matrix of each wetting system. However, as the level of open porosity of the Y_2O_3 substrates increased, the Ti-oxide content initially gradually decreased and subsequently increased. The alloy in