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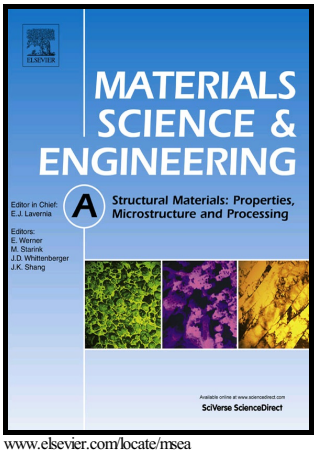

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Microstructures and mechanical properties of directionally solidified Ni-25%Si full lamellar in situ composites

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Abstract:

Directional solidification experiments have been performed on Ni-25at.% Si alloy using electron beam floating zone method. A fully regular eutectic microstructures consisting of Ni, γ-$Ni_{31}Si_{12}$ and β_1-Ni_3Si have been obtained. The influences of the directional solidification rate on the microstructures and properties of the full lamellar structures have been studied. The results show that the relationship between the mean interphase spacing (λ) and withdrawal rate (v) meets $\lambda=29.9v^{-0.65}$. The hardness increases with the increasing of growth rate (v) and decreasing of the interlamellar spacing (λ) which meets the relationship of $H_V=445.2v^{0.14}$ and $H_V=910\lambda^{-0.21}$. The maximum compressive strength, 2576 MPa, for DS samples is obtained by 10mm/h.