steel research international

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Cover Photo:

This work attempts to identify the knowledge structure of steel research by analyzing the keywords and authors of the abstracts published within the journal *Steel Research International* from 1990 to 2013. 2430 papers in the journal were analyzed using co-word and social network analysis. The results provide valuable insights into understanding the knowledge structure of the steel research field and directions for *Steel Research International*. More details can be found in the article by Il Sohn and co-workers on page 10.

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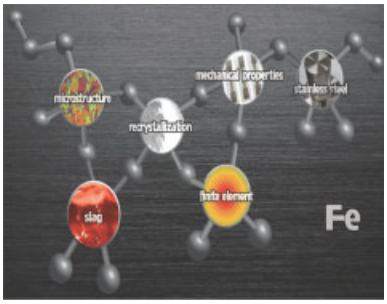
Contents

Editorial
Sandra Kalveram
7

Editorial Comment on the Paper "Looking Back at *Steel Research International* and Its Future"
Wolfgang Bleck
9

Full Paper
H. Lee and I. Sohn*
Looking Back at *Steel Research International* and Its Future
10



The knowledge structure of steel research in the journal of *Steel Research International* from 1990 to 2013 is identified by extracting and analyzing 5700 keywords from 2430 papers. Analysis of the keyword frequency and subgrouping provide valuable insights into understanding the knowledge structure of the steel research field and research directions for *Steel Research International*.

Contents

M. Thumfart* and M. Javurek

Low Pressure Effects in SEN-Stopper Region in Continuous Casting

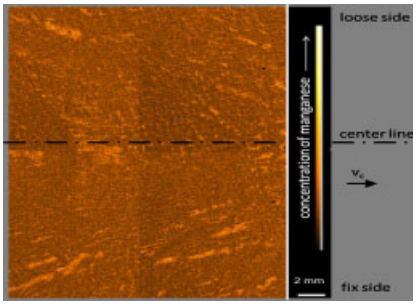
25

Low pressures arising in the stopper rod gap are analyzed. The criteria for degassing of liquid steel are investigated. A mathematical model is presented for a two-phase flow situation (liquid steel/gas) in the SEN considering pressure distribution, throughput, geometrical parameters, amount of gas in the SEN and pressure loss coefficient at the stopper rod.

T. Brune,* K. Kortzak, D. Senk, N. Reuther, and M. Schäperkötter

A Three Dimensional Model to Characterize the Centerline Segregation in CC Slabs

33

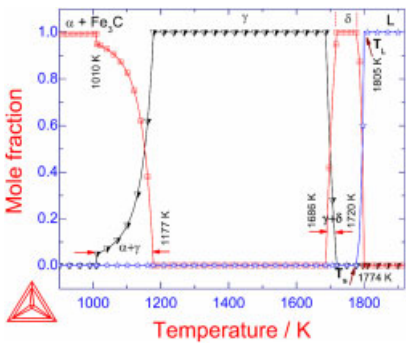


The centerline segregation in CC slabs results of different discrepancies. The former explanation that mainly the effect of bulging is reasonably for macrosegregation in thick slabs is disproved. In reality, the quasi periodicity of segregations in longitudinal direction, results of the independence of regions within continuous casting slabs.

H. Tripathy, R. Subramanian,* V. N. Kani, R. N. Hajra, A. K. Rai, M. Rengachari, S. Saibaba, and T. Jayakumar

High Temperature Phase Stability and Heat Capacity of Fe-0.28 Mn-0.55Si-0.045C (Mass%) Magnetic Alloy: A Calorimetric Study

40

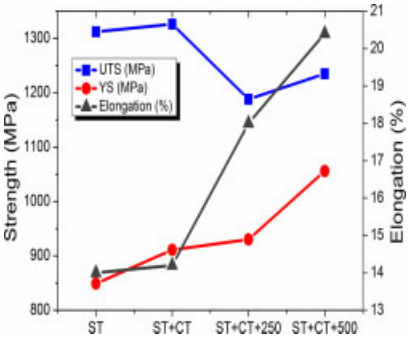


Thermal stability and phase transformation characteristics of Fe-0.28Mn-0.55Si-0.045C alloy by calorimetry. Upon heating, following sequence of phase changes occur: $\alpha^{ferro}+(Fe,Mn)_3C \rightarrow \alpha^{para}+(Fe,Mn)_3C \rightarrow \alpha+\gamma \rightarrow \gamma \rightarrow \gamma+\delta \rightarrow \delta \rightarrow \delta+L \rightarrow L$. Liquidus $=1780$ K; Solidus $=1777$ K upon slow cooling. $\Delta^{\circ}H^{\alpha\rightarrow\gamma}=16.02\pm 2$ J g^{-1}; $\Delta^{\circ}H^{\gamma\rightarrow\delta}=21.72\pm 2$ J g^{-1}; $\Delta^{\circ}H^{\delta\rightarrow L}=258\pm 18$ J g^{-1}; $\Delta C_p^{mag} = 0{:}7$ J g^{-1} K^{-1}. Debye–Grüneisen formalism for modeling the vibrational contribution and Hillert–Jarl phenomenological model for magnetic contributions to heat capacity.

C. Krishna S,* N. K. Gangwar, A. K. Jha, B. Pant, and K. M. George

Microstructure and Properties of 15Cr-5Ni-1Mo-1W Martensitic Stainless Steel

51



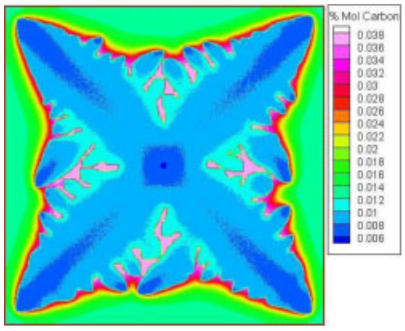
The effect of heat treatment on microstructure and mechanical properties is studied using optical microscopy, electron microscopy, tensile testing, and X-ray diffraction. Combination of solution treatment (1050 °C), cryo treatment (–70 °C), and aging (500 °C) yield good strength and ductility with yield strength and ultimate tensile strength of 1050 and 1235 MPa, respectively retaining a ductility of 20.4%.

Contents

A. F. Ferreira,* E. G. de Melo, and L. de-Olivé Ferreira

Prediction of Secondary-Dendrite Arm Spacing for Binary Alloys by Means of a Phase-Field Model

58

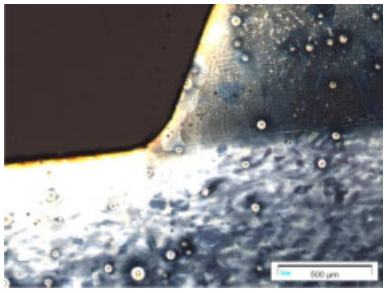


In materials science, the phase-field model is widely used as one of the powerful computational methods to simulate the formation of complex microstructures during solidification and phase transformation of metals and alloys. In the present study, the secondary-arm spacing for Fe–C binary alloys is numerically predicted using a phase-field model in a twodimensional domain.

J. Rezende,* D. Senk, and D. Hüttenmeister

Phase-Field Modeling of the Dendrite Growth Morphology with Influence of Solid–Liquid Interface Effects

65

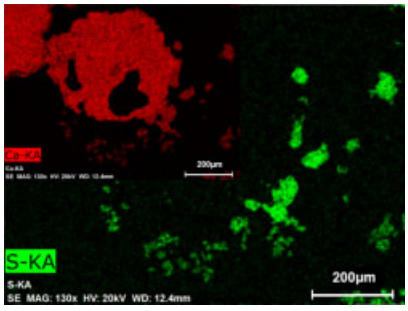


Segregation during casting of high manganese steels may impair their mechanical properties. Simulations by the phase-field method may be utilized to investigate the development of microsegregation during solidification. By utilizing the sessile-drop values for the interface energy, simulations were run aiming at investigating its effect on the dendrite morphology.

D. Lindström and D. Sichen*

Study on Desulfurization Abilities of Some Commonly Used Desulfurization Agents

73

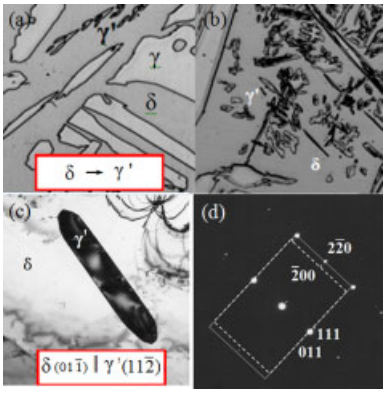


The desulfurization abilities of some commonly used agents, namely fluidized CaO, CaC_2, commercial-CaO, Mg, MgO, CaO · MgO, and mixtures of commercial-CaO–Mg are studied and compared under the same experimental conditions in a laboratory furnace at 1773 K. The desulfurization mechanisms of CaO · MgO, commercial-CaO, and mixtures of commercial-CaO and Mg are also studied.

H. Li, G. Fan, Y. He, J. Bai, C. Zhang, and P. Han*

Austenite Transformation Behaviour of 2205 Duplex Stainless Steels under Hot Tensile Test

84



The initial secondary austenite phase (γ′) transformation occurs only in the cooling process and under hot tensile test condition. The γ′ precipitates in the temperature range of 950–1150 °C. The γ′/δ phase interface is coherent at 950 °C. However, the γ′/δ phase interface is not coherent at 1100 °C.