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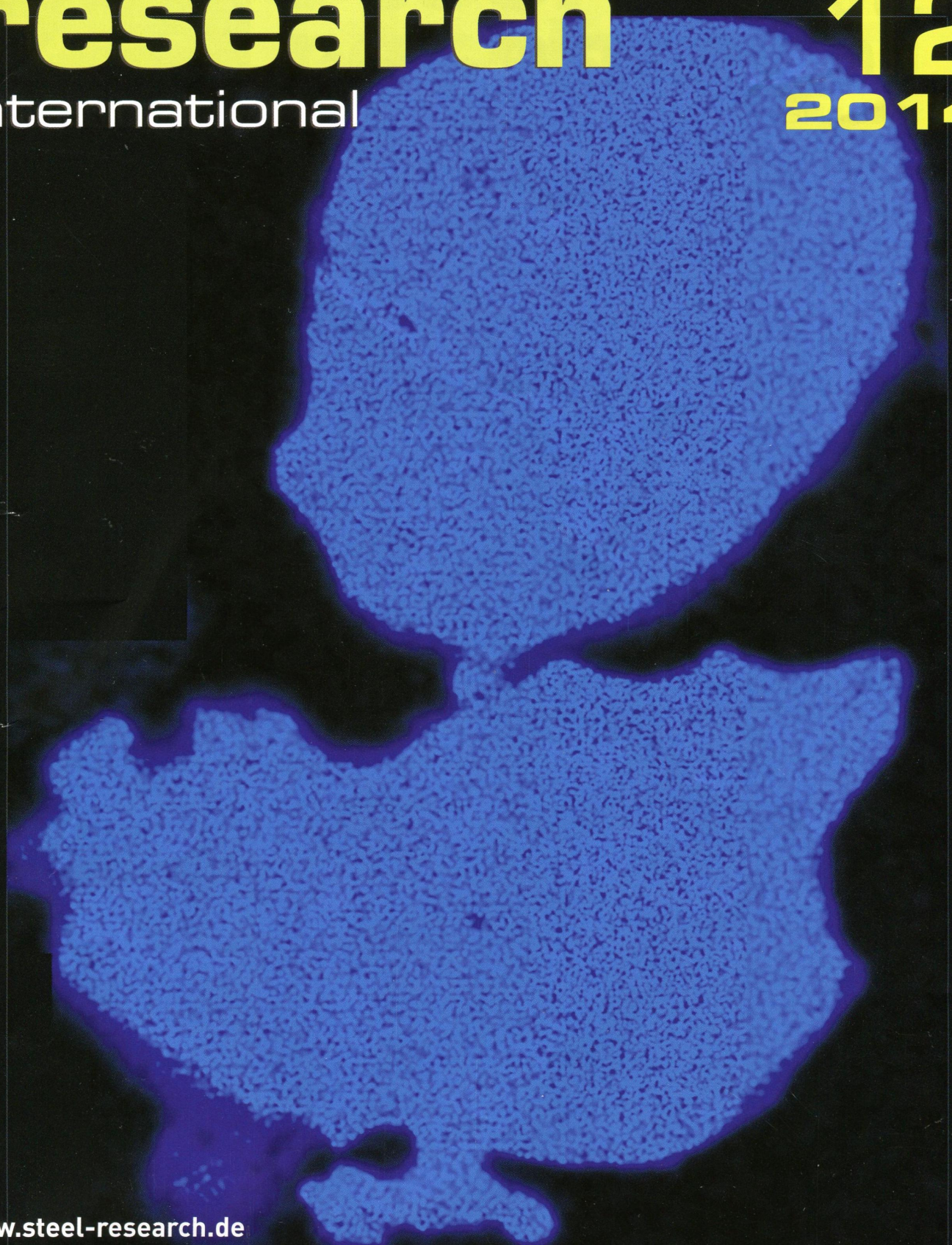

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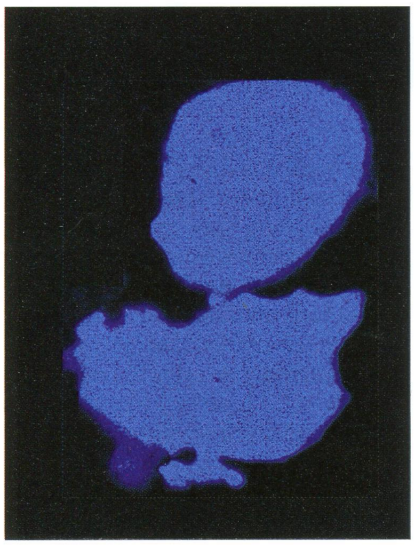

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Cover Photo:

The front cover figure shows the cross section of two water atomized iron powder particles. A challenge during water atomization is to control the oxidation of the liquid metal, especially for alloys which contain elements with a high affinity to oxygen. More details in this subject are illustrated in the manuscript by F. Persson and co-workers on page 1629.

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Contents

Editorial

W. Bleck

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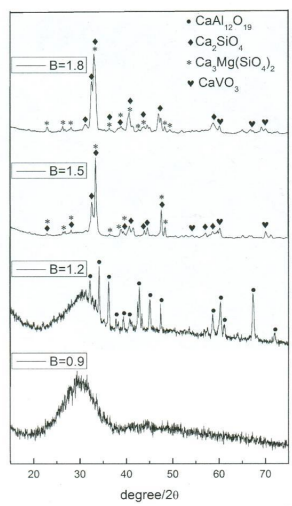
Full Paper

Y. Yang, L. Teng,* and S. Seetharaman

Experimental Study of Phase Equilibria in $CaO–SiO_2–MgO–Al_2O_3–V_2O_3$ Slags

1588



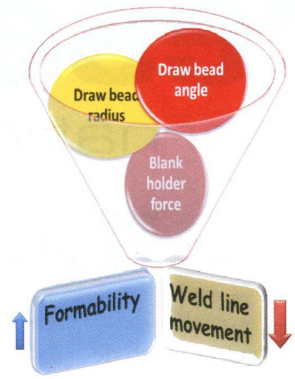
Phase relationships in the $CaO–SiO_2–MgO–Al_2O_3–V_2O_3$ slags are studied using gas-slag equilibration technique. The slag samples are equilibrated in a gas mixture of CO, CO_2 and Ar gases at oxygen partial pressures of 10^{-5} Pa and 0.21×10^5 Pa at temperatures 1773–1823 K (1500–1550 °C). The impacts of slag basicity, temperature and oxygen partial pressure on the phase equilibria are investigated. Vanadium distribution between the slags and solid Pt and phase compositions are analysed using SEM, EDS and XRD techniques. Activities of $VO_{1.5}$ in slags are also calculated.

Contents

K. Hariharan, N.-T. Nguyen, N. Chakraborti,* M.-G. Lee,* and F. Barlat

Multi-Objective Genetic Algorithm to Optimize Variable Drawbead Geometry for Tailor Welded Blanks Made of Dissimilar Steels

1597

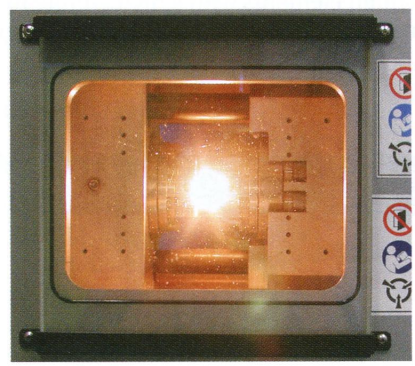


Tailor welded blanks made by joining twinning-induced plasticity (TWIP) and low carbon steel are studied using a multi-objective genetic algorithm. The results of finite element simulations on them are captured in metamodels of weld line movement and formability by using the recently developed Evolutionary Neural Network (EvoNN) algorithm. Both are then simultaneously optimized to obtain a Pareto front, leading to some most preferable forming conditions.

J. A. Haapakangas,* J. A. Uusitalo, O. J. Mattila, S. S. Gornostayev, D. A. Porter, and T. M. J. Fabritius

The Hot Strength of Industrial Cokes – Evaluation of Coke Properties that Affect Its High-Temperature Strength

1608

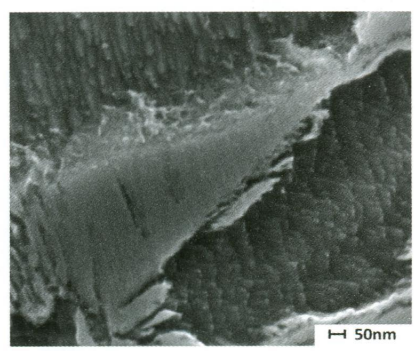


The strength of metallurgical coke is vital for efficient blast furnace operation. The hot strength of industrial cokes is studied by using a Gleeble 3800 thermomechanical simulator. The properties of coke that could affect their hot strength are determined and discussed.

B. Garbarz* and W. Burian

Microstructure and Properties of Nanoduplex Bainite–Austenite Steel for Ultra-High-Strength Plates

1620



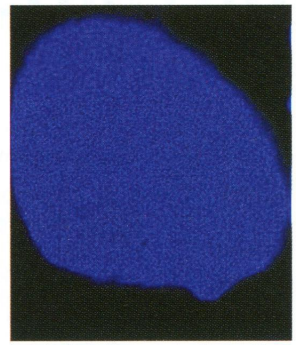
Basing on experimentally determined continuous cooling transformation (CCT) and time–temperature–transformation (TTT) diagrams, measurements of mechanical properties and examination of microstructure an optimized chemical composition of a nanostructured bainite–austenite steel intended for production of plates is proposed. The optimized composition enables to manufacture ultra-high-strength plates up to 15 mm in thickness.

Contents

F. Persson,* A. Eliasson, and P. G. Jönsson

Oxidation of Water Atomized Metal Powders

1629



This study focuses on the oxidation of water atomized metal powders. Pilot tests are performed for iron powders alloyed with manganese and carbon. The particle shape and the oxides are determined using optical and scanning electron microscopy with energy dispersive X-ray micro-analysis. In addition, equilibrium calculations are carried out to enable a comparison of the experimental data with equilibrium values.

X. Zhang,* L. Zhao, J. Zang, H. Fan, and L. Cheng

Hybrid MATLAB and LabVIEW with T-S Cloud Inference Neural Network to Realize a Flatness Intelligent Control System

1639

In this paper, T-S cloud inference neural network is proposed. It is a new neural network constructed by cloud model and T-S fuzzy neural network. Based on the new neural network, Virtual Flatness Intelligent Control System is successfully developed by hybrid MATLAB and Lab-VIEW. Graphical programming language is utilized to realize flatness pattern recognition, flatness prediction, and flatness control.