DAY 1

Plenary Sessions

International Conference on

Metal, Mining and Magnetic Materials

November 01-02, 2018 | Paris, France

DAY 1

November 01, 2018

Sessions

Magnetism and Magnetic Materials | Electromagnetism | Spintronics | Superconductivity and Super fluidity | Special Magnetic Materials | Materials Processing | Metals and alloys | Nano Materials and Nano technology | Thermal Stresses | Corrosion

Session Chair
Franck Delplace
ESI Group Scientific Committee, France

Session Co-Chair
Georges Bouzerar
CNRS-Université Lyon, France

Session Introduction

Title: Magnetic microgel assemblies for injectable soft biocomposites
L De Laporte, DWI-Leibniz Institute for Interactive Materials e V, Germany

Title: Search for new high Tc superconductors and unusual irreversible magnetic behaviour in three unrelated materials
Israel Felner, The Hebrew University of Jerusalem, Israel

Title: Magnetic and transport properties in Mn doped III-V semiconductor: the cases of GaAs and InP
Georges Bouzerar, CNRS-Université Lyon, France

Title: Microstructure and corrosion of Zn-Mg-Ca ternary alloys
Jiri Kubásek, UCT Prague, Czech Republic

Title: Shandite type $Co_3Sn_2S_2$ = $Sn_2Co_3S_2$ – story, structure, magnetism
Richard Weihrich, University of Augsburg, Germany

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L De Laporte et al., J Mat. Sci. 2018, Volume:6
DOI: 10.4172/2321-6212-C7-032

MAGNETIC MICROGEL ASSEMBLIES FOR INJECTABLE SOFT BIOCOMPOSITES

L De Laporte[1], J Rose[1], Lukas Kivilip[2], D Gehlen[2], A Omidinia[2], C Licht[2] and W Rohlfs[2]

[1]DWI-Leibniz Institute for Interactive Materials e V, Germany
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We have developed the Anisogel, which is a hybrid hydrogel that can be injected in soft tissues to provide unidirectional guidance. Rod-shaped microgels and short fibers are rendered magnetic by incorporating low concentrations of iron oxide nanoparticles (SPIONs) and align in magnetic fields in the millitesla range. The anisometric elements are fabricated with variable dimensions, aspect ratio, stiffness, and SPION amount. After alignment, surrounding pre-polymer solutions can crosslink into a network to fix the position of the elements after removal of the magnetic field. To understand the physical mechanisms behind the ordering of the soft magnetic elements, experimental data is compared with a model based on the magnetic rotation of an ellipsoidal element dispersed in a Newtonian fluid. This enables us to predict the orientation state and alignment time of the microgels, depending on their design parameters, and the viscosity of the surrounding fluid. When mixed with cells and nerves, the cells align and grow in a linear manner and the fibronectin produced by fibroblasts is also oriented. RGD modification of the microgels further improves the orientation of the cells but significantly reduces fibronectin production. The mechano-sensitive protein yes-associated protein (YAP) shuttles to the nucleus due to the mechanical anisotropy of the Anisogel. Regenerated nerves are functional with spontaneous activity and electrical signals propagating along the anisotropy axis of the material

Biography

L De Laporte has graduated from the University of Ghent as a Chemical Engineer. She obtained her PhD at Northwestern University in the laboratory of Lonnie Shea, where she focused on the development of scaffolds for spinal cord repair. During her Postdoc at EPFL, Switzerland, she worked with Jeffrey Hubbell in the field of regenerative hydrogels and protein engineering. In 2015, she received an ERC Starting Grant to develop the Anisogel, which is an injectable hybrid hydrogel that orients *in situ* to direct cell and nerve growth. Recently, she was awarded with the Leibniz Professorinnen Program, for which she now has a joined position between the DWI–Leibniz Institute for Interactive Materials and the RWTH Aachen, Germany. At DWI, she coordinates the Bioactive and Bioinstructive Materials Research Program. In her research group, synthetic biomaterial constructs are designed for tissue regenerative purposes.

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SEARCH FOR NEW HIGH TC SUPERCONDUCTORS AND UNUSUAL IRREVERSIBLE MAGNETIC BEHAVIOUR IN THREE UNRELATED MATERIALS

Israel Felner
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Following the phase diagram of AFe2As2 (A=Ba, Sr) in which superconductivity (SC) emerges from magnetic states and the similarity between AFe_2As_2 and RFe_2X_2 (R=La, Y and Lu, X=Si or Ge) systems, RFe_2M_2 was proposed as a potential candidate for a new high TC superconducting family containing Fe-X (instead of Fe-As) layers as a structural unit. Dozens samples of RFe_2-$xMxX_2$ (M=Ni, Mn and Cu) materials were synthesized and measured for their magnetic properties. None of these materials is SC down to 1.8 K. In all samples, pronounced magnetic peaks appear at various temperatures up to 232 K for YFe_2Si_2. $_{57}$Fe Mössbauer studies confirm the absence of long range magnetic ordering down to 5 K. On the other hand, traces for two SC phases (at T_C=32 and 66 K) have been observed in inhomogeneous commercial and fabricated amorphous carbon (a-C) doped with sulfur (a-CS). Non-SC a-CS samples, exhibit pronounced peaks in their virgin zero-field-cooled (ZFC) curves at T_P~50-80 K. Around T_P, the field-cooled (FC) curves cross the ZFC plots. Thus at a certain temperature range ZFC>FC, this behaviour is irreproducible and disappears in the second ZFC and/or the FC runs. The same peculiar observation (ZFC>FC) was observed in two other unrelated systems: in chiral-based magnetic memory devices where the components are: α-helix L-polyalanine, Au, Al_2O_3 and Co or Ni layers. The ZFC>FC phenomenon is observed only in the hard direction only. In a pathological liver tissues, the unusual ZFC>FC phenomenon cannot be ascribed to extra magnetic phases (oxygen), and are an intrinsic property of these three unrelated systems. We assume that in the ground state of each system, the intrinsic local magnetic moments are randomly distributed. In the first ZFC runs, low dc magnetic fields, align these moments to flip along its direction in a FM manner up to the peak position. Above TP, an antiparallel exchange coupling is more favoured and in the next ZFC and/or FC processes the net magnetic moments are lower and cross the ZFC branches

Biography

Israel Felner has completed PhD in1973 from the Hebrew University (HU) of Jerusalem, Israel and Postdoctoral studies at UCSD, San-Diego, USA. Since 1973 to till date, he works at the Racah Institute of Physics at the HU. He became a Full Professor in 1995. He served as the Chairman of the Physics Studies (2003-2006). His main interest topics are: Structural, Magnetism and Mossbauer studies of Rare-earth inter-metallic, High Tc superconductivity and Magneto-Superconducting Materials and search for new High Tc Superconductors. He published more than 510 papers in reputed journals. He serves as a Chief-Editor of *Journal of Superconductivity and Novel Magnetism and as an* Editorial Board Member *of Materials Research Express journal*.

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MAGNETIC AND TRANSPORT PROPERTIES IN MN DOPED III-V SEMICONDUCTOR: THE CASES OF GAAS AND INP

Georges Bouzerar
CNRS-Université Lyon 1, France

The nature of carrier-induced ferromagnetism in both Mn doped III-V compounds GaAs and InP is investigated. Although, direct band gap and effective masses are very close in both InP and GaAs, we demonstrate that the magnetic properties change drastically. The influence of the acceptor level position on magnetic properties will prove to be crucial. Because of both dilution effects (percolation) and short-range nature of the carrier induced Mn-Mn magnetic couplings (calculated), thermal/transverse spin fluctuations and disorder effects (localization) have to be properly treated (beyond effective medium or perturbation approach). To tackle this issue efficiently, different large-scale theoretical approaches are combined: Kernel polynomial method (KPM) for the accurate calculation of Mn-Mn couplings, Monte Carlo (MC) and local random phase approximation (L-RPA) for the magnetic properties (TC, T- dependent magnetization, and magnetic excitation spectrum and spin stiffness). TC in (In, Mn) P is found much smaller than that of Mn doped GaAs and scales linearly with Mn concentration in contrast to the square root behavior found in (Ga, Mn) As. Moreover, we find that the magnetization behave almost linearly with the temperature in contrast to the standard mean field Brillouin shape. These findings are in quantitative agreement with the experimental data and reveal that magnetic and transport properties are extremely sensitive to the position of the Mn acceptor level. We finally discuss the transport properties in both compounds and demonstrate that our non-perturbative theory is able to capture not only qualitatively but quantitatively as well the transport properties in these materials such as the infrared optical conductivity, the carrier and Mn concentration dependent Drude weight, the effects of sample annealing, and also the metal-insulator-transition as observed experimentally in Mn doped GaAs, whilst (In-Mn) P remains an insulating compound

Biography

Georges Bouzerar is a Research Director at Centre National de la Recherche Scientifique (CNRS). He is an expert in quantum and classical magnetism (itinerant and localized) and in quantum transport. He has completed his PhD in Mesoscopic Physics (interplay between electron-electron interaction and disorder) in 1996 from Paris XI (Orsay) University. He has spent several years as a Postdoc in Germany (Koeln University, Berlin University, Max Planck Institute) and in France (Laue Langevin Institute in Grenoble). He got a Senior Scientist permanent position at CNRS in 2004 and became research director in 2011. Over the past 10 years he has focused attention on spintronics, in particular on magnetism and transport in diluted magnetic semiconductors and non-magnetic impurity induced ferromagnetism. He has contributed by about 25-30 papers to this research area and received a prize in 2014 from the French Academy of Science for his achievements in this field.

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MICROSTRUCTURE AND CORROSION OF ZN-MG-CA TERNARY ALLOYS

Jiri Kubasek[1], D Dvorsky[1], J Capek[2], J Pinc[2] and D Vojtech[1]

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[2]Institute of Physics, Czech Academy of Sciences, Czech Republic

Zinc-based alloys are considered as alternative possibility compared to magnesium in the case of the development of biodegradable materials for medical applications. The main reasons are related to the low corrosion rate, the absence of hydrogen evolution during degradation in an organism, biocompatibility of Zn and possibility to improve mechanical properties of Zn by suitable alloying. In such case, Mg and Ca which represents essential elements in the human organism are considered as good candidates. Present paper brings the knowledge about microstructure, mechanical and corrosion properties of Zn-0.8 Mg-0.2 Ca ternary alloy in the as-cast, thermally treated and as-extruded conditions. Obtained results indicate that microstructure conditions in the as-cast state are affected by cooling rates. Thermal treatment affects the alloy phase composition, although solubility of Mg and Ca in Zn is neglectable. The changes of microstructure directly affect mechanical properties of prepared materials. Processing by extrusion causes a significant increase of mechanical properties with the values of UTS over 300 MPa. Corrosion rates of variously processed materials are similar and no significant changes were observed in simulated body fluid

Biography

Jiří Kubásek has completed his PhD in Properties of magnesium alloys usable as biodegradable materials from UCT Prague in 2017. He lectures at the UCT Prague and is also responsible for the management of the Diploma and Bachelor thesis. His scientific research is focused on the development and characterization of magnesium- and zinc-based biodegradable materials. He also works at the Institute of Physics of the Czech Academy of Sciences, where he participates on the studies related to the processing of the surface of various materials by laser peening. He has published more than 27 papers in high impact journals and more than 15 papers in other reputed journals presented on SCOPUS.

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SHANDITE TYPE $Co_3Sn_2S_2$ = $Sn_2Co_3S_2$ – STORY, STRUCTURE, MAGNETISM

Richard Weihrich[1,2], Florian Pielnhofer[2]

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[2]University of Regensburg, Germany

$Sn_2Co_3S_2$, a highly anisotropic S½ half metal ferromagnet (HFM) was just found as magnetic Weyl semimetal with intrinsic giant anomalous Hall Effect (AHE). The compounds was first prepared in our institute in 1979, predicted as HFM in 2001 and characterised as half antiperovskite $SnCo_{3/2}S$. It crystallizes in shandite type structure i.e. $Pb_2Ni_3S_2$. When its ferromagnetism with TC=176 K was investigated by DFT calculations, a fascinating half metal S=½ ground state was discovered. The prediction of the magnetic state was confirmed from experimental investigations on single crystals that have further shown a completely anisotropic out-of-plane magnetic ordering of spins in Kagomé-layers of Co atoms. Studies on its magnetism in the following decades finally led to the recent discoveries of topological properties and a giant anomalous hall effect. Here, we review the crystal and electronic structure of $Sn_2Co_3S_2$=$SnCo_{3/2}S$ including the concept of half anti-perovskites (HAP) that was developed from the relation to $MgNi_3C$..

Biography

R. Weihrich has completed his PhD at the age of 28 years at the University of Regensburg, followed by postdoctoral studies at CNRS Bordeaux, Paris, and Dresden. He is Professor at the University of Augsburg. He has published more than 75 papers in reputed journals.

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Metal and Magnetism 2018

DAY 1

Video Presentation

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Eliade Stefanescu, J Mat. Sci. 2018, Volume:6
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MAGNETIC MOMENT OF A CHARGED QUANTUM PARTICLE AS A RELATIVISTIC DISTRIBUTION OF MATTER

Eliade Stefanescu
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The starting point of our research is an error in the conventional quantum mechanics based on the Schrodinger equation: the solution of this equation is a wave packet in the coordinate space with the time-dependent phases proportional to the Hamiltonian, while the group velocity in this space is in agreement with one of the Hamilton equations, the group velocity in the conjugated space, of the momentum, is contradictory to the other Hamilton equation. The agreement with the Hamilton equations is obtained only by replacing the Hamiltonian with the Lagrangian. In this case, instead of the conventional Schrodinger equation, one obtains a Schrodinger-type equation which, besides the Hamiltonian, includes the product of the momentum with the velocity as an additional term. It is reasonable to consider the relativistic Lagrangian. Since the Lagrangian of a quantum particle is proportional to the time-space interval, which includes the gravitational field, the relativistic quantum principle can be defined as the invariance of the time dependent phases of the wave packet describing a quantum particle. On the other hand, if the invariance of the time-space interval is considered as a principle, in the framework of the general theory of relativity we find that any acceleration of a differential element of matter under the action of an external field is perpendicular to the velocity of this element in the internal, gravitational field. This means that the matter dynamics in a central field is a rotation around the center of this field. For the distribution of the rotating matter in a standing state, a Fourier series expansion can be considered. The matter corresponding to a Fourier component is called quantum particle. In this way, quantum mechanics can be considered as a Fourier representation of the relativistic mechanics of a distribution of matter. In this case, the Schrodinger-Dirac equation and the spin are obtained for a low velocity, when the momentum-velocity product is negligible compared to the particle energy, which includes the rest energy. When the spin is neglected, the conventional Schrodinger equation with the classical Hamiltonian, which does not include the rest energy, is obtained. The particle interaction with an electromagnetic field is described by a time dependent phase variation, with a vector potential conjugated to the coordinates and a scalar potential conjugated to time. From the invariance of this phase variation, the Maxwell equations of the electromagnetic field are obtained, while the matter dynamics of the particle is characterized by a magnetic moment interacting with this field.

Biography

Eliade Stefanescu has graduated from the Faculty of Electronics, Section of Physicist Engineers in 1970, and after a long activity in the field of the research and development of the semiconductor devices, he obtained a PhD in Theoretical Physics in 1990. He discovered a phenomenon of penetrability enhancement of a potential barrier by dissipative coupling. He developed a microscopic theory of open quantum systems, discovered a physical principle and invented a device for heat conversion into usable energy, and produced a unitary quantum relativistic theory. He is member of American Chemical Society and of Academy of Romanian Scientists. He received the Prize of Romanian Academy for physics in 1983, and the Prize Serban Titeica in 2014, for his book entitled "*Open quantum physics and environmental heat conversion into usable energy*". He has been invited to present his results in numerous international conferences, as Speaker, Keynote Speaker, and Member of the organizing committee.

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PROCESSING OF TITANIFEROUS MAGNETITE ORES WITH VARIOUS CONTENT OF TITANIUM DIOXIDE

Andrey N Dmitriev, Galina Yu Vitkina and Roman V Petukhov
Institute of Metallurgy-Ural Branch of Russian Academy of Sciences, Russia

The results of laboratory, industrial and calculation researches of physical, chemical and thermophysical processes at the oxidizing roasting (sintering and pelletizing) of the titaniferous raw materials are considered. The estimation of influence of metallurgical properties (reducibility, durability, softening and melting temperatures of roasting ores) on processes heat and mass exchange at the reduction in the blast furnace (two-dimensional fields of gas and charge temperatures, degrees of iron reductions, cohesion zone) is executed. Titan-bearing ores with the various TiO2 content are investigated. Tests of ores are provided by ores of the current production in the Gusevogorsky deposit (average test), and also ores from separate production of ores - is low titanium and is high titanium. Ores of the Kuranakhsky deposit, the Tebinbulaksky deposit (Republic of Uzbekistan) and high titanium ores of the Medvedevsky deposit and the Yaregsky deposit allowing receiving pigmentary titanium dioxide are also considered. Processing of the specified ores assumes so-called schemes «blast furnace - converter» and «metallization - electro melting», including oxidizing roasting of ore concentrate with receiving agglomerate and pellets. The micro X-ray diffraction phase analysis and magnetic characteristics of samples is made. The results of industrial tests on change of metallurgical properties of agglomerate and its influence on blast furnace indices are given. Technical and economic indices of blast furnace smelting of agglomerate and pellets (consumption of coke and productivity, chemical composition of cast iron and slag), received from a concentrate of the Kachkanarsky deposit, are calculated. The mathematical model of blast furnace process is considered. As a whole possibility and reasonability of processing of titaniferous ores with the different content of titanium dioxide and receiving vanadium containing cast iron and the slag containing titanium dioxide is shown. **Work is executed with financial support of the State Task of Institute of Metallurgy of the Ural Branch of the Russian Academy of Sciences, the Project No.0396-2015-0081 and the Russian Foundation for Basic Research, the Project No.16-08-00062**

Biography

Professor, Doctor of Technical Sciences, Chief Research Officer of Institute of Metallurgy of the Ural Branch of the Russian Academy of Sciences, Professor of Ural Federal University, Academician of Russian Academy of Natural Sciences, Academician of Academy of Engineering Sciences of Russian Federation. Area of research interest - development, perfection of mathematical models and their use for the analysis and optimization of processing of ores.Has graduate from Metallurgical Faculty of Ural Polytechnical Institute (nowadays Ural Federal University, Ekaterinburg, Russia). It is awarded with the Honourable Diploma of a Student's Scientific Organization. Achieved awards: Honourable Letter of Russian Academy of Sciences, V.E.Grum-Grzhimajlo Premium-Medal, Honourable Letter of Government of Sverdlovsk Region, Silver Medal «Metal-Expo'2014», Award of Governor of Sverdlovsk region, Diploma of 1 degree and Gold Medal of the Petersburg engineering fair, Medal and Order of Academy of Engineering Sciences named A.M. Prokhorov «For a contribution to development of engineering sciences». The author of 6 monographs, more than 300 papers and 12 inventions.

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CORROSION OF A STRUCTURAL STEEL BURIED IN A LOAMY SOIL

Baghdad Miloud, Ait Saadi Bachir and Sadi Mohammed Said
University of Science and Technology, Algeria

In recent years, with the advancement in technologies, construction engineers have been working to replace quarry sand by raw earth in the construction field,. For this purpose, several studies have been launched on these materials. In this work, we have studied the corrosion of a structural steel immersed in loamy soil. To achieve that, electrochemistry methods such as electrochemical impedance spectroscopy (EIS), voltammetry, and free potential measurements were performed on a radiometer, potentiometer PGZ 301 to test the samples. The results were adjusted using ZSimpWin software to determine the kinetic parameters such as corrosion potential and corrosion rate, The results showed that the evolution of the corrosion rate goes through two phases, the first phase corresponds to a decrease from an initial value around 35 µm/year to reach the value 14 µm/year after an immersion time between 750 and 900 hours, The second phase shows a fluctuation of the corrosion rate followed by a long stabilization around the value 22 µm/year after 7000 hours immersion time. The corrosion rate values obtained by the two methods, Stern Gerry and linear polarization were compared to validate our calculations. The energy dispersive X-ray analysis (EDS) and dynamic recrystallization (DRX) analysis showed the formation of a passive film around the steels which was composed of different species such as magnetite, etc., where the film plays a very important role on the evolution of the corrosion process

Biography

BAGHDAD Miloud, in February 2015. He enrolled in PhD after a national competition under the theme, study of corrosion of steels in composite materials, option Physics of materials. In December 5/ 2017 participate in 5th doctoral day under the theme (corrosion study of steels immersed in soils environment). In April 17/ 2018 i made an experimental presentation at the 11th Scientific and Technical Day (3rd edition of the scientific exhibition Algeria) Algeria, in April 2017. He spend a month of internship at Havre university (France) at the laboratory (Ondes ET Milieux Complexes, UMR CNRS 6294, LOMC), His work related with the fields, corrosion of material, impedance spectroscopy measurement, Analytical Chemistry and surface characterization.

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DAY 2

Plenary Sessions

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DAY 2

November 02, 2018

Sessions

Metallurgical sciences | Corrosion | Metals and alloys | Smart Materials | Structured Materials| Functional Materials | Geomagnetism

Session Chair
Vladimir Mironov
3D Bioprinting Solution, Russia

Session Introduction

Title: **Energy saving and service life improvement of ladle linings using micro pore alumina aggregate**
Meijie Zhang, Wuhan University of Science and Technology, China

Title: **Dynamic interaction of alumina-magnesia refractory and molten steel**
A O Huang, Wuhan University of Science and Technology, China

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ENERGY SAVING AND SERVICE LIFE IMPROVEMENT OF LADLE LININGS USING MICRO PORE ALUMINA AGGREGATE

Meijie Zhang, Huazhi Gu and Lvping Fu
Wuhan University of Science and Technology, China

The properties of refractories have great effect on the quality of steel, energy consumption and cost of steelmaking. In this paper, the influence of micropore alumina aggregates on the properties of Al2O3-MgO castable used in lade working lining was studied, and the energy saving ladle lining materials were designed. The results showed that the bulk density of Al_2O_3-MgO castable prepared by micropore alumina aggregates was reduced by 7.5%, the strength was increased by more than 40%, the thermal conductivity at 1000 ∏ was reduced by 19%, and the thermal shock stability was increased by one time. When reacting with the Basic Oxygen Furnace (BOF) end slag, the CaO-Al_2O_3 phases were formed and interlaced distributed in the micropores, and a dense layer at the interface of slag and castable was formed which prevented further infiltration and erosion of the molten slag. The Al_2O_3-MgO castable prepared by micropore alumina aggregates was designed as the working lining in the ladle, the light castable as the permanent lining and the nanoporous material as heat insulation lining, the out shell temperature can be reduced to 200 below. The Al_2O_3-MgO castable prepared by micropore alumina aggregates was used in the 300t ladle in Wisco steel, and showed less damaged than the common used castable under the same conditions. Moreover, the microporous corundum aggregates showed good potential to improve the thermal shock stability using in the slab, nozzle and other refractories

Biography

Meijie Zhang has completed her PhD specialized in material science and metallurgy engineering in 2006 from Wuhan University of Science and Technology and senior visiting scholar researches specialized in the new concept of heat transfer from Tsinghua University school of aerospace engineering in 2007. She is a professor of Wuhan University of Science and Technology. She has published more than 50 papers in reputed journals and more than 20 China patents. Her research interests cover mathematical and physical simulation of the application and wear of refractories, preparation of energy saving refractories.

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DYNAMIC INTERACTION OF ALUMINA-MAGNESIA REFRACTORY AND MOLTEN STEEL

A O Huang[1], Yajie Wang[1], Huazhi Gu[1], Jun Li[2], Zhongxing Lei[2] and Bihui Yi[2]

[1]The State Key Laboratory of Refractories and Metallurgy-Wuhan University of Science and Technology, China

[2]Wuhan iron and Steel Group refractory Co Ltd-Baowu Steel Group, China

As the lining of metallurgical vessels, refractory material is in direct contact with moving molten steel during the entire refining process. The dynamic interaction between molten steel and refractory material will seriously affect the service life of refractory lining and restrict the smelting safety and efficiency of steelmaking. In this paper, experiments on the interaction between alumina-magnesia castable and molten steels under dynamic smelting conditions were performed. The corrosion behaviour of molten steel on the alumina-magnesia refractory and the effect on the steel cleanliness was analysed and discussed. The corrosion mechanism of the alumina-magnesia refractory was revealed. The modified capillary number (Ca) can be used to compare the refractory wear by estimating the critical velocity of the emulsification. Furthermore, the empirical formulas for the emulsion droplet size were established, the formation and evolution mechanism of the inclusions was illustrated, which provides guidance for the application of refractory materials in the smelting of high quality steel

Biography

A.O Huang has completed his PhD in Material Science from Wuhan University of Science and Technology and Postdoctoral in Material Science and Metallurgy Engineering Studies from University of Leoben. He is a Professor of The State Key Laboratory of Refractories and Metallurgy, and School of Materials and Metallurgy. He has published more than 30 papers in reputed journals and has been serving as an Associate Editor in *Journal of the Australian Ceramic Society*.

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DAY 2

Young Research Forum

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EFFECT OF SMALL/LARGE ALTERNATIVE EXTRUSION CYCLES AND PRECIPITATES ON THE SUPER HIGH STRENGTH OF A800 (AL-ZN-MG-CU) ALUMINIUM ALLOYS

Tsai Fu Chung[1] , Wayne Hong[2], Chien Nan Hsiao[3], Chan Tung Chen[2], Manny Lin[2], Wei Chih Li[4] and Jer Ren Yang[1]

[1]National Taiwan University, Taiwan
[2]Advanced Material Specialty, Inc., Taiwan
[3]National Applied Research Lab, Instrument Technology Research Center, Taiwan
[4]E A Fischione Instruments Inc, USA

The Al-Zn-Mg aluminium alloys subjected to the one step ageing treatments were recognized as the high mechanical strength aluminium alloys (i.e., the tensile strength~550 MPa) in the world. Recently, the A800 (Al-8.9 Zn-2.1Mg, wt %) aluminium alloys possessing the highest mechanical strength in aluminium alloys (i.e., the tensile strength~784 MPa) have been successedly developed. The newly developed heat treatment (i.e., small/large alternative extrusion cycles) combined with nano-scaled precipitates apparently resulted the higher mechanical strength. Complementary to the electron backscattered diffraction (EBSD) investigation on the grain size distribution, Cs-corrected high-angle annular dark-field scanning transmission electron microscopy (Cs-corrected HAADF-STEM) extrapolate the contribution of precipitate evolution on the mechanical properties

Biography

PhD student under Prof. Jer-Ren, Yang's Lab in Department of Materials Science and Engineering, National Taiwan University. The research mainly focus on the exploration and characterization of microstructural evolution of precipitates in Al-Cu-Li and Al-Zn-Mg-Cu series aluminium alloys by high-resolution transmission electron microscopy (HRTEM) and Cs-corrected high-angle-annular-dark-field scanning-transmission-electron microscopy (Cs-corrected HRSTEM). Complementary to micrograph analysis, the quantitative measurement in precipitates accompanying with variable ageing treatment has been characterised by small-angle X-ray scattering (SAXS).

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STUDY OF DISSOLUTION RATE OF SINK ROLL MATERIAL IN PURE ZINC BATH AND ZINC-0.2 WT % ALUMINIUM BATH

Sagarika Bhattacharjee[1], Mahesh G Walunj[2], Vidhi Acharya [1] and L C Pathak[2]

[1]Indus University, India
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Sink rolls are used to guide the steel sheets into the molten zinc bath in continuous hot dip galvanizing line. They are usually made of AISI SS 316L material due to its properties like high corrosion resistance, low tendency towards carbide precipitation and hot strength characteristics. High temperature immersion corrosion test using potentio-dynamic polarization set up was performed to study the dissolution rate of AISI SS 316L material in pure zinc bath and zinc-0.2 wt % aluminium bath at three different temperatures: 460 °C, 480 °C and 500 °C for 5 hours. It was observed that dissolution rate of AISI SS 316L was maximum at 480 °C with negative open circuit potential with respect to graphite and minimum at 500 °C with positive open circuit potential with respect to graphite. Dissolution rate of AISI SS 316L material was found more in pure zinc bath compared to zinc-0.2 wt % aluminium bath due to formation of protective and adhesive intermetallic inhibition layer during test

Biography

Sagarika Bhattacharjee has completed her B Tech in Metallurgical Engineering from Indus University, Gujarat in the year 2018. She was awarded POSCO Asia Fellowship 2017. She has participated in various events like Student Start-up and Innovation Policy by Government of Gujarat, 55th National Metallurgists' Day (NMD) and 71st Annual Technical Meeting (ATM) at BITS Pilani won second prize for paper presentation in BTTD 2017 at CSIR-NML, Jamshedpur, won second prize for paper presentation at IIT, Gandhinagar. She is presently working on a research paper on Corrosion Science.

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