



# 2023 International Symposium on Hydrogen Metallurgy (ISHM2023)

September 5-7, 2023

Chongli, Hebei Province, China

## Preliminary Technical Program

Organized by



HBIS Group



The Chinese Society for Metals

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## Plenary Lectures

### 大会特邀报告

Date & Time: September 05, 2023, 08:00-19:30

日期和时间: 2023年9月5日, 08:00-19:30

#### Session1

#### 第一部分

- 09:05 - 09:35      **Thinking of Transformation and Upgrading of Chinese Steel Production in the Face of Carbon Neutrality**  
Tao Jiang (Central South University, China)  
碳中和背景下中国钢铁生产转型升级的思考  
姜涛 (中南大学, 中国)
- 09:35 - 10:05      **HBIS Green and Low-carbon Development Strategy Thinking and Innovation Practice**  
Yiren Li (HBIS Group, China)  
河钢绿色低碳发展战略思考与创新实践  
李毅仁 (河钢集团, 中国)
- 10:05 - 10:35      **Progress and Prospect of Low-carbon Ironmaking Technology and Hydrogen Metallurgy Process**  
Jianliang Zhang ( University of Science and Technology Beijing, China)  
低碳炼铁技术及氢冶金工艺进展及展望  
张建良 (北京科技大学, 中国)
- 10:35 - 10:50      **Coffee Break 茶歇**
- 10:50 - 11:20      **Modelling and Analysis of Hydrogen Blast Furnace**  
Aibing Yu (Monash University, Australia)  
氢气高炉建模与分析  
余艾冰 (莫纳什大学, 澳大利亚)
- 11:20 - 11:50      **Hydrogen: A Key Element in Transforming the Steel sector or Climate Change and the Production of Iron and Steel: An Industry View**  
Andrew Purvis (World Steel Association (worldsteel), Belgium)  
氢: 钢铁行业转型的关键要素或气候变化与钢铁生产: 行业观点  
Andrew Purvis (UFOP: 欧鲁普雷图联邦大学, 比利时)
- 11:50 - 12:20      **JFE Steel's Initiatives toward Carbon Neutrality**  
Yasuo Kishimoto (JFE, Japan)  
JFE的碳中和举措  
Yasuo Kishimoto (JFE钢铁公司, 日本)

## Session2

### 第二部分

- 13:30 - 14:00 **Update on the development of hydrogen-based ironmaking process at POSCO**  
Myoung-Gyun Shin (POSCO, Korea)  
浦项制铁HyREX工艺回顾与开发  
Myoung-Gyun Shin (浦项制铁集团公司, 韩国)
- 14:00 - 14:30 **Fluidized bed hydrogen direct reduction: history and perspective**  
Qingshan Zhu (Institute of Process Studies, Chinese Academy of Sciences, China)  
流态化直接还原, 从基础到工业示范  
朱庆山 (中科院过程所, 中国)
- 14:30 - 15:00 **Technological Pathways and Process Routes towards CO<sub>2</sub>-free Production**  
Johannes Schenk (Montanuniversitaet Leoben, Austria)  
实现无二氧化碳生产的技术途径和工艺路线  
Johannes Schenk (莱奥本蒙塔大学, 奥地利)
- 15:00 - 15:30 **Recent Work of Hydrogen Blast Furnace Ironmaking: from Numerical Analysis to Industry Applications**  
Yansong Shen (University of New South Wales, Australia)  
氢高炉炼铁的最新工作: 从数值分析到工业应用  
沈岩松 (新南威尔士大学, 澳大利亚)
- 15:30 - 15:45 **Coffee Break 茶歇**
- 15:45 - 16:15 **SSAB's transformation to a fossil free company with the HYBRIT technology**  
Martin Pei (KTH Royal Institute of Technology, Sweden)  
SSAB利用HYBRIT技术转型为无化石公司  
Martin Pei (KTH皇家理工学院, 瑞典)
- 16:15 - 16:45 **Basic Theoretical Research on Hydrogen Metallurgy**  
Xionggang Lu (Shanghai University, China)  
氢冶金基础理论研究  
鲁雄刚 (上海大学, 中国)

- 16:45 - 17:15      **Key Technical Challenges of Hydrogen Shaft Furnace Ironmaking and the Countermeasures**  
Geoff Wang (University of Queensland, Australia)  
氢基竖炉炼铁的关键技术挑战及对策  
Geoff Wang (昆士兰大学, 澳大利亚)
- 17:15 - 17:45      **Reduction Behaviour of Hydrogen with FeO in Synthetic Molten HIsarna Slag**  
Zushu Li (The University of Warwick, United Kingdom)  
氢与FeO在合成的HIsarna熔渣中的还原行为  
Zushu Li (华威大学, 英国)

## Plenary Lectures 大会特邀报告

Date & Time: September 06, 2023, 08:00-13:30

日期和时间: 2023年9月6日, 08:00-13:30

### Session3 第三部分

- 08:00 - 08:30      **Green and Low-carbon Hydrogen Metallurgy Technology Innovation and Engineering Practice for Carbon Neutrality**  
Zhilong Zhao (MCC Jingcheng, China)  
面向碳中和的绿色低碳氢冶金技术创新与工程实践  
赵志龙(中冶京诚, 中国)
- 08:30 - 09:00      **Enabling Hydrogen Storage and Transport: Unleashing Cost-Effective Potential through Liquid Organic Hydrogen Carriers**  
Muxina Konarova (University of Queensland, Australia)  
实现氢气储存和运输: 通过液态有机氢载体释放成本效益潜力  
Muxina Konarova (昆士兰大学, 澳大利亚)
- 09:00 - 09:30      **Decarbonization to a green end state: BHP Billiton's steel decarbonization plan**  
Nigel Tame (BHP, Australia)  
脱碳到绿色终端状态: 必和必拓的钢铁脱碳计划  
Nigel Tame(BHP, 澳大利亚)
- 09:30 - 10:00      **Ways and Projects to Climate Neutral Iron and Steelmaking in Europe**  
Hans Bodo Lungen (VDEh Institute, Germany)  
欧洲实现气候中性铁和炼钢的途径和项目  
Hans Bodo Lungen (德国钢铁学会, 德国)
- 10:00 - 10:15                                      **Coffee Break 茶歇**
- 10:15 - 10:45      **The steel industry transitioning to sustainability through ENERGIRON direct reduction technology**  
Stefano MAGGIOLINO (Tenoun, Italy)  
通过ENERGIRON直接还原技术向可持续发展转型的钢铁工业  
Stefano MAGGIOLINO (特诺恩, 意大利)

10:45 - 11:15      **Analysis and Optimization of Hydrogen-based Shaft Furnace Smelting Process**

Mansheng Chu (Northeastern University, China)

氢基竖炉冶炼过程解析与优化

储满生 (东北大学, 中国)

11:15 - 11:45      **To be determined**

BMW Brilliance, Germany

待定

华晨宝马汽车有限公司, 德国

## Parallel sessions 1

分会场一

Date: September 6, 2023

日期: 2023 年 9 月 6 日

### Session1

第一部分

13:30-13:55	<b>Keynote</b> Theoretical study of controlling carbon deposition of hydrogen-rich reducing gases Fengman Shen(Northeastern University, China) 控制富氢还原性气体积碳的理论研究 沈峰满 (东北大学, 中国)
13:55-14:20	<b>Keynote</b> A Fundamental Study of the Carburization of DRI by CH <sub>4</sub> /CO ZhengjianLiu (University of Science and Technology Beijing, China) DRI 在 CH <sub>4</sub> 和 CO 气氛下的渗碳行为基础研究 刘征建 (北京科技大学, 中国)
14:20-14:40	H <sub>2</sub> reduction and carbidization of Fe <sub>2</sub> O <sub>3</sub> with pure CH <sub>4</sub> Alberto Conejo (University of Science and Technology Beijing, China)纯 CH <sub>4</sub> 对 Fe <sub>2</sub> O <sub>3</sub> 的 H <sub>2</sub> 还原和碳化 Alberto Conejo (北京科技大学, 中国)
14:40-15:05	<b>Keynote</b> Basic Science Behind Sustainable Metallurgy Dr.-Ing. Yan Ma (Max-Planck-Institut für Eisenforschung GmbH, Germany) 可持续冶金背后的基础科学 Dr.-Ing. Yan Ma (马克斯-普朗克研究所, 德国)
15:05-15:25 Coffee Break 茶歇	
15:25-15:45	Computational materials design contributing to sustainable metallurgy Wangzhong Mu (KTH Royal Institute of Technology, Sweden) 计算材料设计有助于可持续冶金 Wangzhong Mu (瑞典皇家理工学院, 瑞典)
15:45-16:10	<b>Keynote</b> Fundamental science for hydrogen ironmaking: understanding hydrogen reduction at atomistic scale 氢冶金基础科学问题: 从原子尺度理解氢还原反应机理 KejiangLi(University of Science and Technology Beijing, China) 李克江 (北京科技大学, 中国)
16:10-16:30	CFD study of injection operation for hydrogen-bearing materials in an ironmaking blast Furnace Ziguang Zhao(University of New South Wales, Australia) 炼铁高炉含氢材料喷射操作的 CFD 研究 Ziguang Zhao (新南威尔士大学, 澳大利亚)

16:30-16:50	<p>Numerical study of the direct reduction of single pellets in the HITECOM reactor  Fengbo An(TU Bergakademie Freiberg, Germany)  HITECOM 反应器中单颗粒直接还原的数值研究  Fengbo An (弗莱贝格工业大学, 德国)</p>
16:50-17:10	<p>A DFT survey about generation of fuel hydrogen through organic molecules splitting on ironmaking process  炼铁过程中有机分子裂解生成燃料氢的 DFT 研究  Davi Neves Pavanelli (Universidade Federal de Ouro Preto, Brazil)  Davi Neves Pavanelli (欧鲁普雷图联邦大学, 巴西)</p>
17:10-17:30	<p>Low cost green hydrogen preparation technology for metallurgical industry  Li Li (Northeastern University, China)  冶金工业低成本绿色氢气制备技术  李犁 (东北大学, 中国)</p>
17:30-17:50	<p>The influence of hydrogen and carbon monoxide interaction on reduction, carbon evolution and sulfur transition reaction in hydrogen-rich blast furnace  Jian Xu (Chongqing University, China)  富氢高炉内氢气与一氧化碳相互作用对还原、析碳与硫转变反应的影响规律  徐健 (重庆大学, 中国)</p>
17:50-18:10	<p>Microstructural evolution of wüstite after reacting with H<sub>2</sub> and CO-CO<sub>2</sub> at low temperature  Qiaoyu Zheng (Wuhan University of Science and Technology)  钨与 H<sub>2</sub> 和 CO-CO<sub>2</sub> 在低温下反应后的微观结构演变  郑巧玉 (武汉科技大学, 中国)</p>



## Parallel sessions 2

分会场二

Date: September 6, 2023

日期: 2023年9月6日

### Session2

第二部分

13:30-13:55	<b>Keynote</b> Research on Hydrocarbon Coupling Metallurgical Technology in Blast Furnace Ironmaking Fuming Zhang (Shougang Group Co., Ltd. China) 高炉炼铁碳氢耦合冶金技术研究 张福明(首钢集团, 中国)
13:55-14:20	<b>Keynote</b> Impact of basicity on hydrogen-rich gas-based direct reduction of fired pellets Deqing Zhu (Central South University, China) 铁矿氧化球团富氢气体直接还原行为研究 朱德庆(中南大学, 中国)
14:20-14:45	<b>Keynote</b> Research and Analysis on the Impact of Hydrogen Energy Utilization on Iron Ore Raw Materials under the Background of "Hydrogen Inspires the Future" Gele Qing (Shougang Group Co., Ltd. China) “氢启未来”背景下氢能利用对铁矿石原料的影响研究与分析 青格勒(首钢集团, 中国)
14:45-15:05	Simulation of the Effects of Hydrogen Injection on the Main Indicators of Blast Furnace and Carbon Dioxide Emission Reduction by Zero-Dimensional Model Guohai Zhu (Air Liquide (China) R&D Co., Ltd. China) 喷氢对高炉主要指标影响及二氧化碳减排的零维模型模拟 朱国海(液化空气(中国)研发有限公司, 中国)
15:05-15:25 Coffee Break 茶歇	
15:25-15:45	Production and Application of Low Cost Green Hydrogen Hongchao Ji (HBIS Industrial Technology Service Co., Ltd. China) 低成本绿氢的制备和应用 吉洪潮(河钢工业技术服务有限公司, 中国)
15:45-16:10	<b>Keynote</b> Study on hydrogen-rich gas-based direct reduction of oxide pellets made by magnetite concentrate Jian Pan (Central South University, China) 磁铁精矿制备氧化球团的富氢气体直接还原研究 潘建(中南大学, 中国)
16:10-16:30	Analysis and Comparison of Energy Saving and Emission Reduction of Blast Furnace Injection with Different Hydrogen-rich methods Yana Qie (NorthChina University of Science and Technology, China) 不同富氢方式高炉喷吹节能减排的分析与比较 郗亚娜(华北理工大学, 中国)

16:30-16:50	<p>Hydrogen rich injection operation and engineering practice in Steel Enterprises With Long Process Flow</p> <p>Qichen Hu (MCC Capital Engineering &amp; Research Incorporation Limited, China)</p> <p>钢铁长流程富氢喷吹操作及工程实践</p> <p>胡启辰（中冶京诚，中国）</p>
16:50-17:10	<p>The effect of COG injection on the raceway</p> <p>Peng Li (WISDRI Engineering &amp; Research Incorporation Limited, China)</p> <p>COG 注入对滚道的影响</p> <p>李鹏（中冶南方，中国）</p>
17:10-17:30	<p>Analysis of Large Scale Hydrogen Production Technology and Its Impact on Cost of Hydrogen Metallurgy</p> <p>Jinzhe Liu (HBIS Group Strategic Research Institute, China)</p> <p>规模化绿氢制备技术及其对氢冶金成本的影响分析</p> <p>刘金哲（河钢集团战略研究院，中国）</p>
17:30-17:50	<p>H<sub>2</sub> utilisation in an ironmaking blast furnace with top gas recycling and CO<sub>2</sub> electrolysis</p> <p>Yichao Hu (University of Queensland, Australia)</p> <p>H<sub>2</sub> 炉顶煤气回收和 CO<sub>2</sub> 电解在炼铁高炉中的应用</p> <p>Yichao Hu（昆士兰大学，澳大利亚）</p>
17:50-18:10	<p>Mathematical model and industrial validation of blast furnace ironmaking with injecting hydrogen through tuyeres</p> <p>风口喷氢高炉炼铁的数学模型及工业验证</p> <p>Jiameng Lei (Wuhan University of Science and Technology, China)</p> <p>雷佳萌（武汉科技大学，中国）</p>

### Parallel sessions 3

#### 分会场三

#### Session3

#### 第三部分

13:30-13:55	<p><b>Keynote</b> Green transformation,low-carbon development-Innovative Practice of HYMEXTM ( 1.2 Million Tons of Hydrogen Metallurgical Engineering Demonstration ) in HBIS Group AiJun Zheng (HBIS Group Zhangxuan Technology,China) 绿色转型、低碳发展——河钢集团 120 万吨氢冶金工程示范(HYMEXTM)创新实践 郑艾军（河钢宣钢，中国）</p>
13:55-14:20	<p><b>Keynote</b> The Planning and Operation for Large Scale Utilization of Green Hydrogen in Hydrogenation Metallurgy: Take Baowu Steel Group for Example Wu Yiwei (Baowu Clean Energy Company, China) 绿氢规模化消纳的氢冶金系统的优化规划：以宝武钢铁的全国布局为例 吴亦伟（宝武清洁能源公司，中国）</p>
14:20-12:45	<p><b>Keynote</b> A review on modelling and simulation on shaft furnace hydrogen metallurgy Ning Yang (Institute of Process Engineering, Chinese Academy of Sciences,China) 竖炉氢冶金建模与仿真研究综述 杨宁（中国科学院过程工程研究所，中国）</p>
14:45-15:05	<p>Advancing Towards Net Zero 2060: The Future Role of Direct Reduction in China's Steel Industry Hermann Völkl (Primetals Technologies Austria GmbH,Austria) 迈向 2060 年净零排放：直接减排在中国钢铁工业中的未来作用 Hermann Völkl (普锐特冶金技术奥地利股份有限公司,奥地利)</p>
15:05-15:25 Coffee Break 茶歇	
15:25-15:45	<p>Industrial Experiment and Analysis of Hydrogen-rich Gas Injection in Blast Furnace in Ansteel Wei Zhang (Ansteel Iron &amp; Steel Research Institutes, China) 鞍钢高炉喷吹富氢气体的工业试验与分析 张伟（鞍钢集团钢铁研究院，中国）</p>
15:45-16:05	<p>A novel process of Low-Carbon Ironmaking with Pure-Oxygen and Hydrogen-rich in Reduction &amp; Smelting Furnace based on long process Xing Han (HBIS Material Technology Research Institute, China) 基于长流程的富氧富氢还原熔炼炉低碳炼铁新工艺 韩星（河钢材料技术研究院，中国）</p>

16:05-16:25	<p>A novel technology of co-injecting hydrogen and biomass in blast furnaces for a sustainable carbon-neutral ironmaking: concept and preliminary CFD study</p> <p>Ming Jiang Gan (University of New South Wales,Australia)</p> <p>可持续碳中和炼铁高炉内共喷氢和生物质的新技术：概念和初步的 CFD 研究</p> <p>Ming Jiang Gan（新南威尔士大学，澳大利亚）</p>
16:25-16:45	<p>Performance analysis of the first month operation of the COG basis Direct Reduction Plant in HBZX</p> <p>Kaiwei Tan (HBIS HBZX Hydrogen metallurgy company,China)</p> <p>张宣科技焦炉煤气直接还原装置首月运行业绩分析</p> <p>覃开伟（河钢集团张宣科技氢冶金公司，中国）</p>
16:45-17:05	<p>Fundamental and Industrialized Research on Hydrogen-Based Flash Ironmaking Technology</p> <p>Lei Guo (University of Science and Technology Beijing,China)</p> <p>氢基闪速炼铁技术的基础与产业化研究</p> <p>郭磊（北京科技大学，中国）</p>
17:05-17:25	<p>A Study on the Kinetics and Reduction Properties of Ammonia Directly Reducing Iron Ores</p> <p>Yuejun Liu (University of science and technology Liaoning,China)</p> <p>氨直接还原铁矿石的动力学及还原性能研究</p> <p>Yuejun Liu（辽宁科技大学，中国）</p>
17:25-17:45	<p>The reduction of ilmenite under H<sub>2</sub> atmosphere: advantages of fluidized bed of pre-oxidized ilmenite</p> <p>Jiehan Zhang (University of Science &amp; Technology Beijing,China)</p> <p>H<sub>2</sub> 气氛下钛铁矿的还原：预氧化钛铁矿流化床的优点</p> <p>Jiehan Zhang（北京科技大学，中国）</p>
17:45-18:10	<p><b>Keynote</b> Grey Hydrogen: How the GHG emission in the iron and steelmaking production can be reduced by using waste</p> <p>Paulo Santos Assis (UFOP: Federal University of Ouro Preto,Brazil)</p> <p>利用沼气减少钢铁生产温室气体排放</p> <p>Paulo Santos Assis（欧鲁普雷图联邦大学，巴西）</p>

## Parallel sessions 4

### 分会场四

#### Session4

#### 第四部分

13:30-13:55	<b>Keynote</b> Innovation practice and strategic thinking of hydrogen energy industry in iron and steel industry HongQiang Liu (HBIS,China) 钢铁工业氢能产业创新实践与战略思考 刘宏强（河钢集团，中国）
13:55-14:20	<b>Keynote</b> Progress in Theoretical Research and Technological Development of Hydrogen Reduction Processes by Central Iron and Steel Research Institute PeiMin Guo (Research Institute of technology Shougang Group Co., Ltd,China) 钢铁研究总院在氢气还原新工艺的理论及技术研发进展 郭培民（钢铁研究总院，中国）
14:20-14:45	<b>Keynote</b> Several key issues worth being deeply explored in the common difficult technologies of hydrogen metallurgy process Yonglong Jin (HBIS,China) 氢冶金工艺常见难点技术中值得深入探讨的几个关键问题 金永龙（河钢集团有限公司，中国）
14:45-15:05	Successful Use of Hydrogen as Fuel in Melting and Heating Processes Joachim von Scheele (Linde GmbH,Germany) 氢气作为燃料在熔化和加热过程中的成功应用 Joachim von Scheele（林德股份有限公司，德国）
15:05-15:25 Coffee Break 茶歇	
15:25-15:50	<b>Keynote</b> Progress and Prospect of Energy Technology in Low Carbon Metallurgy Process Rao Wentao(Baowu Clean Energy Co., Ltd., China) 低碳冶金工艺中氢能技术进展及展望 饶文涛（宝武清能，中国）
15:50-16:10	Study on EAF steelmaking technology by using Hydrogen-based DRI HongTao Pan (CERI,China) 基于氢冶金 DRI 的电炉炼钢技术研究 潘宏涛（中冶京诚，中国）
16:10-16:30	A pragmatic multipronged approach to sustainability at Tenova Paolo Argenta (Tenova Metals,Italy) 推出多方位多渠道的可持续发展的务实方案 Paolo Argenta（特诺恩，意大利）

16:30-16:50	<p><b>EAF Steelmaking with Hydrogen based Direct Reduced Iron: Challenges and Reflections</b>  Botao Xue(University of Science and Technology Beijing,China)  氢基直接还原铁电弧炉炼钢的挑战与思考  薛波涛（北京科技大学,中国）</p>
16:50-17:10	<p><b>CFD-DEM modelling for the gas-particle flow behavior under charging process in hydrogen-rich injection shaft furnace</b>  Yinxuan Qiu(University of Queensland, China)  富氢喷射竖炉充气过程中气体颗粒流动行为的 CFD-DEM 建模  Yinxuan Qiu（昆士兰大学，澳大利亚）</p>
17:10-17:30	<p><b>Digital technology research on Hydrogen-based DRI</b>  YingJian Xue(CERI,China)  数字孪生技术在氢冶金领域的应用  薛颖健（中冶京诚数科，中国）</p>
17:30-17:50	<p><b>From the aspect of process detection and control, the key means to improve the safety and efficiency of hydrogen in metallurgical processes are discussed</b>  Wanhe Gao(Hebei Zhangxuan High-tech Technology Co., Ltd,China)  从过程检测和控制的角度,探讨了提高冶金过程氢气安全性和效率的关键手段  高万河（河北张宣高科科技有限公司，中国）</p>
17:50-18:10	<p><b>Design and Implementation of Safety Instrumented System (SIS) for Hydrogen Based Reduction Shaft Furnace Factory</b>  Quangang Li (Hbzx HIGH Tech Co., Ltd.,China)  氢还原竖炉厂安全仪表系统的设计与实现  李全钢（河北张宣高科科技有限公司，中国）</p>