

HES-UIE 2026

International Conference on Heating by Electromagnetic Sources

Padua, 15 - 18 September 2026

Final programme - 10 September 2026

The Conference runs as a **single track, with no parallel sessions**. Each oral contribution is allotted 15 minutes: 12 for the presentation and 3 for discussion.

The author shown in **bold** gives the presentation. Conference Chair: Fabrizio Dughiero.

Venue: all the sessions of 16, 17 and 18 September are held in the Auditorium of the Centro Culturale Altinate San Gaetano, via Altinate 71, Padua. Registration takes place there on Wednesday 16 September, from 8.00. The welcome cocktail of Tuesday 15 September is held in the Sala Egizia of Caffè Pedrocchi, via VIII Febbraio 15.

TUESDAY 15 SEPTEMBER 2026

18.00 - 21.00 Welcome Cocktail - Sala Egizia, Caffè Pedrocchi

WEDNESDAY 16 SEPTEMBER 2026

08.30 - 09.00 *Registration*

09.00 - 09.30 Opening Ceremony

Institutional addresses and opening of the Conference

Fabrizio Dughiero - University of Padova, Italy (Conference Chair)

Sergio Lupi - University of Padova, Italy (Honorary Chairman)

Egbert Baake - Leibniz University Hannover, Germany

Koen Van Reusel - Laborelec / KU Leuven, Belgium

09.30 - 10.10 INVITED KEYNOTE LECTURE

“Green Steel: Sustainability Challenges of the Ecological Transition and Danieli’s Innovative Technologies for the Decarbonisation of the Steel Industry”

Ing. Claudio Fabbro - Executive Vice President R&D, DANIELI & C. Officine Meccaniche S.p.A.

10.10 - 10.30 *Discussion*

10.30 - 11.00 *Coffee Break - Posters on display*

11.00 - 12.30 Session S1 - Electromagnetic Processing, Electrification and Green Steel

Chairmen: Jerzy Barglik - Silesian University of Technology, Poland · Stephane Nasser El Dine - ArcelorMittal Maizieres Research, France

11.00 - 11.15 [27] Mamdouh Omran, Hao Yao and Timo Fabritius

Microwave processing steel making side streams

Univ. of Oulu (FI)

11.15 - 11.30 [23] Sven Eckert

Electrification of high-temperature industrial processes: the European CITADEL project

HZDR (DE)

11.30 - 11.45 [9] Martins Sarma, Lars Skaarup Jensen and Sven Eckert

Calcination of Limestone via Induction Heating

HZDR (DE)

11.45 - 12.00 [21] Michael Dumont, Ahmed Essyed, Van-Hieu Ngo, Jean Mario Nhut, Cuong Pham-Huu and Arnaud Brazier

Electrification of Chemical processes: methane pyrolysis via induction heating for H₂ production
EMDPI (FR)

12.00 - 12.15 [43] Igor Niedzwiecki and Egbert Baake

Sustainable electrification of fossil fueled thermoprocessing applications
Leibniz Univ. Hannover (DE)

12.15 - 12.30 [2] Thorsten Ott

Ceramic Induction Air Heater Based on Cellular Structures for High-Temperature Process Heat
DLR (DE)

12.30 - 13.30 Lunch

13.30 - 15.15 Session S2 - Materials Processing and Innovative Products

Chairmen: Andris Jakovics - University of Latvia, Latvia · Albert Smalcerz - Silesian University of Technology, Poland

13.30 - 13.45 [3] Jan Hrbek

Indirect Induction Heating for Tungsten Detritiation
Research Centre Rez (CZ)

13.45 - 14.00 [4] Jan Hrbek, David Rot, Adrian Villalba Weinberg, Dmitrii Komissarenko and Andreas Börger

Electrical conductivity of white fused alumina in the liquid state
Imerys Villach (AT)

14.00 - 14.15 [5] Dmitrii Komissarenko, Adrian Villalba Weinberg, Jasmin Koller, Veronika Müller, Bruno Korner and Andreas Börger

Scandia-stabilized Zirconia for electrochemical cells: Synthesis in Cold Crucible
Imerys Villach (AT)

14.15 - 14.30 [24] Baseer Ahmed, I. V. Poznyak and Vaclav Kotlan

Estimation of the Electrical Resistivity of Gadolinium Oxide inside the Cold Crucible using the Inverse Problem Technique via ANSYS
Univ. West Bohemia, Pilsen (CZ)

14.30 - 14.45 [34] Karel Slobodník and Václav Kotlan

3D Printed Metal-Doped Ceramics for Induction Heating Susceptors
Univ. West Bohemia, Pilsen (CZ)

14.45 - 15.00 [8] Zhi Yi, Alexander Koeppen and Egbert Baake

Reliable High-Temperature Electrical Contacting for Structurally Integrated Thermally Sprayed Heating Elements
Leibniz Univ. Hannover (DE)

15.00 - 15.15 [63] Giovanni Gardan, Giulio Poggiana, Francesco Lucchini, Michele Forzan, Fabrizio Dughiero and Riccardo Torchio

Electrothermal Processes for Rare Earth Element Recycling from Energy-Transition E-Waste: A Review
Univ. Padova (IT)

15.15 - 16.00 Coffee Break - Posters on display

16.00 - 17.30 Session S3 - Induction Heating: Coil Design and Applications

Chairmen: Oscar Lucia - University of Zaragoza, Spain · Vaclav Kotlan - University of West Bohemia in Pilsen, Czech Republic

16.00 - 16.15 [42] Krzysztof Konopka and Jerzy Barglik

Induction Surface Hardening of Steel Workpieces Examples of Applications
Silesian Univ. of Technology (PL)

16.15 - 16.30 [15] Dmitry Ivanov, John Inge Asperheim, Bjørnar Grande and Prerana Das

A Geometrically Parameterized Quasi-Stationary 3D Model for High-Frequency Induction Tube Welding
ENRX (NO)

16.30 - 16.45 [FLX] Robert Goldstein

Changing Goal Functions for Induction Heat Treating Coil Design
Fluxtrol Inc. (US) · invited review

16.45 - 17.00 [30] Philippe Bocher, Luc Amar, Tom Jaulin, Raynald Guilbault and Louis Berger

Design Considerations and Challenges for Optimizing Rolling Fatigue Performance in Induction-Hardened Components

17.00 - 17.15 [25] Johannes Lohn

Additively Manufactured Copper Inductors for Induction Heating Applications

J. Lohn (DE)

17.15 - 17.30 [28] Andrea Trovo, Maria Evelina Mognaschi, Fabrizio Dughiero and Paolo Di Barba

Welding techniques for Flow Battery stack manufacturing: a comparative analysis

Univ. Padova / Univ. Pavia (IT)

THURSDAY 17 SEPTEMBER 2026

09.00 - 10.15 Session S4 - Electrified Reactors, Power Supplies and Equipment

Chairmen: Claudio Carretero - University of Zaragoza, Spain · Claudius Stockinger - University of Stuttgart, Germany

09.00 - 09.15 [62] Marius Weiser, Siegfried Bajohr and Frederik Scheiff

Ohmic Heated Catalytic Reactor Structures: Design and Operational Stability Analysis

KIT (DE)

09.15 - 09.30 [14] Alejandro Pazvantov, Hector Sarnago and Oscar Lucia

Multi-Load Power Electronic Converter for Induction Heating Domestic Applications

Univ. Zaragoza (ES)

09.30 - 09.45 [13] Maxwell Rodriguez, Hector Sarnago, Jesus Acero and Oscar Lucia

Advanced electronic control architecture for electronic power converters applied to induction heating

Univ. Zaragoza (ES)

09.45 - 10.00 [59] Tianfeng Liu and Xiaobing Luo

An ultra-thin plate-level micropump for liquid cooling systems

Huazhong UST (CN)

10.00 - 10.15 [66] A. Doni, M. Lazzarin, Nicholas Sinigaglia and M. Zerbetto

Thermographic Risk Assessment and Electromagnetic Optimization of an Induction Sealing Process

INOVA LAB (IT)

10.15 - 11.00 Coffee Break & Poster Session *(listed at the end)*

11.00 - 12.30 Session S5 - Artificial Intelligence and Numerical Modelling for Electroheat

Chairmen: Robert Goldstein - Fluxtrol Inc., USA · Paolo Di Barba - University of Pavia, Italy

11.00 - 11.15 [1] Antons Cvečkovskis

Physics-Informed Graph Neural Network for Fast Thermal Prediction in Induction Heating

CENOS (LV)

11.15 - 11.30 [10] Oscar Lahuerta Sediles, Claudio Carretero Chamarro, Denis Navarro Tabernero and Jesus Acero
Acero

Physics-Informed Neural Networks for characterizing thermistors immersed in a magnetic field

Univ. Zaragoza (ES)

11.30 - 11.45 [37] Yuki Shimizu, Arata Takahashi, Kengo Sugahara and Keiko Sugahara

AI Agent-Based Automatic Mesh Generation for Induction Heating Simulation with Automatic Boundary Layer Control

Kindai Univ. (JP)

11.45 - 12.00 [41] Jakub Wyciślik and Sławomir Golak

Comparison of methods based on surrogate models on the example of induction heating process optimization

Silesian Univ. of Technology (PL)

12.00 - 12.15 [64] Matteo Zorzetto, Riccardo Torchio, Francesco Lucchini, Michele Forzan and Fabrizio Dughiero

Discrepancy Correction in Surrogate Models for Nonlinear Thermal Problems

Univ. Padova (IT)

12.15 - 12.30 [46] Andrii Chepurnyi and Andris Jakovičs

Acceleration of numerical modeling of methane combustion using a plasma-chemical element in a gas turbine

12.30 - 13.30 Lunch

13.30 - 15.00 PANEL SESSION - AI and Electrification of Thermal Processes

Format: introduction by the moderator (5 min), moderated discussion among the panellists (60 min), Q&A with the audience (25 min).

Topics: the role of AI in the control and optimisation of electrothermal processes; digital twins and surrogate models; high-temperature electrification and green steel; industrial barriers to adoption.

Moderator: Fabrizio Dughiero - University of Padova, Italy (Conference Chair)

Panellists:

Alessandro Ardesi - Danieli Automation, Italy
Egbert Baake - Leibniz University Hannover, Germany
Paolo Di Barba - University of Pavia, Italy
Sven Eckert - Helmholtz-Zentrum Dresden-Rossendorf, Germany
Robert Goldstein - Fluxtrol Inc., USA
Tony Kezer - Fives Celes, France
Oscar Lucia - University of Zaragoza, Spain
Koen Van Reusel - Laborelec / KU Leuven, Belgium

15.00 - 15.45 Session S6 - Optimization, Measurement and Safety

Chairmen: Mihails Birjukovs - University of Latvia, Latvia · John Inge Asperheim - ENRX, Norway

15.00 - 15.15 [19] Borja Lopez-Alonso, Jesus Acero, Eric Agudo, Enrique Gómez-Barrena, Héctor Sarnago and Oscar Lucía

Optimization of an Induction Heating Applicator for Implanted Prosthesis Disinfection

Univ. Zaragoza (ES)

15.15 - 15.30 [67] Fabrizio Dughiero, Francesco Lucchini, Paolo Di Barba, Nicholas Sinigaglia and M. Lazzarin
ARTE: Contactless Temperature Estimation and Energy-Aware Power Optimization for Domestic Induction Hobs

Univ. Padova / Univ. Pavia (IT) · in collaboration with INOVA LAB

15.30 - 15.45 [40] Claudio Carretero, Oscar Lahuerta, Ignacio Lope and Jesus Acero
Self-Heating-Induced Offset Drift in NTC Thermistor for Domestic Induction Heating Systems

Univ. Zaragoza (ES)

15.45 - 16.15 Coffee Break

16.15 - 17.30 Session S6 - Optimization, Measurement and Safety (continued)

16.15 - 16.30 [12] Thomas Wondrak, Max Sieger, Lukas Krause and Sven Eckert
Innovative industrial process monitoring by inductive measurements

HZDR (DE)

16.30 - 16.45 [11] Thomas Wondrak, Max Sieger, Lukas Krause and Sven Eckert
Current tomography for electroheat process monitoring

HZDR (DE)

16.45 - 17.00 [48] Albert Smalcerz, Roman Przylucki and Jerzy Barglik
Some Aspects of Temperature Measurements in Induction Heating Systems

Silesian Univ. of Technology (PL)

17.00 - 17.15 [20] Koen Van Reusel
Safety Assessment According to the European Legislation and IEC Standards Regarding the Industrial Use of Microwave Technology

Laborelec / KU Leuven (BE)

17.15 - 17.30 [31] Vaclav Kotlan, Iveta Petrasova, Radek Holota and Vjaceslav Georgiev
Numerical Shape Optimization for Uniform Direct Electrical Heating of Test Samples

Univ. West Bohemia, Pilsen (CZ)

19.30 - 22.30 Gala Dinner and Ruffini Award Ceremony, presented by Robert T. Ruffini - Salone degli Specchi, Palazzo San Bonifacio

FRIDAY 18 SEPTEMBER 2026

09.00 - 10.30 Session S7 - Microwave and RF Processing

Chairmen: Koen Van Reusel - Laborelec / KU Leuven, Belgium · Max Sieger - Helmholtz-Zentrum Dresden-Rossendorf, Germany

09.00 - 09.15 [17] Muralimohan Juttu Vidyasagar, Ralph Behrend, Hartmut Krause, Mareen Zöllner, Thomas Krampitz and Holger Lieberwirth

Microwave Assisted Recycling of CFRP Composites in a Continuously Operated Conveyor Belt Furnace - Process Parameters and Results

TU Freiberg (DE)

09.15 - 09.30 [47] Matteo Pola, Irene Mellone and Matteo Albani

Scaling up Microwave-Assisted Pyrolysis for Plastic Valorization: Design and Ongoing Challenges

Univ. of Siena (IT)

09.30 - 09.45 [36] Ruth De Los Reyes, Vicente Sanz, Eduard Palomares and Elias De Los Reyes

Laboratory-Scale adaptation of microwave air heating technology for very low gas flow rates

UPV Valencia (ES)

09.45 - 10.00 [44] Elena Colombini, Magdalena Lassinantti Gualtieri, Isabella Lancellotti, Cristina Leonelli and **Paolo Veronesi**

Predictive models for copper slag based microwave susceptors

Univ. Modena e Reggio Emilia (IT)

10.00 - 10.15 [45] Paolo Veronesi, Elena Colombini and Cristina Leonelli

Microwave and induction heating of green carbon anodes for aluminum smelting

Univ. Modena e Reggio Emilia (IT)

10.15 - 10.30 [49] Carmen Alfaro, Ismael Viejo, Javier Sagües, Alberto Pascual, Joaquin Javier Perez Aparicio, Begoña García, Ivan Echeverria, Jose Ignacio Tolosa, Ainhoa Bilbao, Paolo Veronesi, **Elena Colombini**, Marcel Mallah, Panagiotis Davris, Efthymios Balomenos and Marria Herrando

Microwave-Driven Electrification Strategies for High-Temperature Industrial Processes in Ceramic, Asphalt, and Aluminium Production

CIRCE + consortium (ES)

10.30 - 11.00 Coffee Break

11.00 - 12.15 Session S8 - Electromagnetic Melting, Metallurgical Processes and Modelling

Chairmen: Sven Eckert - Helmholtz-Zentrum Dresden-Rossendorf, Germany · Egbert Baake - Leibniz University Hannover, Germany

11.00 - 11.15 [22] Adrian Smagór, Paweł Gradoń, Grzegorz Moskal and Agnieszka Tomaszewska

The influence of heating power on the sinters microstructure of new cobalt superalloys from the Co-Al-W and Co-Ni-Al-W systems

Silesian Univ. of Technology (PL)

11.15 - 11.30 [52] Maksimilians Pīrs, Aleksandrs Jegorovs, **Andris Jakovics** and Mihails Birjukovs

Simultaneous 2D Phase & Velocity Field Measurements for Hele-Shaw Bubble Flow in Liquid Metal

Univ. of Latvia (LV)

11.30 - 11.45 [53] Ansis Emīls Zīvers, Ansis Ziemelis, Kristofers Rolands Kangīzers, Pēteris Zvejnieks and **Mihails Birjukovs**

Shape & Collective Dynamics in Geometrically Confined MHD Bubble Flow

Univ. of Latvia (LV)

11.45 - 12.00 [54] Ansis Emīls Zīvers, Kristofers Rolands Kangīzers and **Mihails Birjukovs**

2WCF-SVD: 2-way consistent Farneback with SVD-based artifact filtering for multiphase optical flow velocimetry

Univ. of Latvia (LV)

12.00 - 12.15 [6] Mirco Fuchs and Egbert Baake

12.15 - 12.45 Closing Session

Fabrizio Dughiero - University of Padova, Italy (Conference Chair)

Sergio Lupi - University of Padova, Italy (Honorary Chairman)

Egbert Baake - Leibniz University Hannover, Germany

Koen Van Reusel - Laborelec / KU Leuven, Belgium

Paolo Di Barba - University of Pavia, Italy (Chair of the Editorial Board)

12.45 - 13.15 *Farewell Lunch - End of the Conference*

POSTER SESSION

Poster Session - Thursday 17 September, 10.15 - 11.00 - posters on display from Wednesday morning

Chairmen: Michele Forzan - University of Padova, Italy (Scientific Secretariat)

- [16] **Pablo Burgos**, Héctor Sarnago and Oscar Lucia
Load detection strategy in new non-resonant inverters applied to domestic induction heating applications
Univ. Zaragoza (ES)
- [32] **Pablo Guillen**, Héctor Sarnago, Jose M. Burdio and Oscar Lucia
A Coupled Inductors Non-Resonant Inverter Topology for Domestic Induction Heating
Univ. Zaragoza (ES)
- [29] **Ignacio Alvarez-Gariburo**, Héctor Sarnago, Gabriel Costa, Fausto Rene Viteri, Tomás García-Martínez, Ramón Murillo Murillo and Óscar Lucía
Design and Implementation of a Power Electronic Generator for Induction-Heated Electrified Biomass Pyrolysis Reactors
Univ. Zaragoza (ES)
- [7] Jesús Acero, Óscar Lahuerta, Denis Navarro, **Claudio Carretero**, Ignacio Lope and José-Miguel Burdío
Electromagnetic Property Identification of Domestic Induction Heating Loads using Neural Networks
Univ. Zaragoza (ES)
- [18] **Borja Lopez-Alonso**, Ismael Perisé-Badía, Nicolás Dulanto, Héctor Sarnago, Óscar Lucía and Ignacio Ochoa
Electrical Characterization System for 3D Tumor Spheroid Models in In Vitro Electroporation Studies
Univ. Zaragoza (ES)
- [35] **Tim Irlweck**, Claudius Stockinger and Ulrich Nieken
Inductive Heating of Chemical Reactors: Experimental and Numerical Investigations
Univ. Stuttgart (DE)
- [57] Victor Demidovich, Yuriy Perevalov and Fedor Chmilenko
Digital Twins of Induction Heaters in the Metallurgical Industry
- [58] **Robert Goldstein**
Understanding What's Not on the Screen When Modeling Electromagnetic Processing
Fluxtrol Inc. (US)
- [60] **Guoqing Sun** and Xiaobing Luo
A High-performance miniature synthetic jet pump for cooling applications
Huazhong UST (CN)
- [65] M. Bullo, C. De Massari and **C. Santoluce**
RF Heating for an Energy Storage System Developed in the Horizon Europe Project HYSTORE
INOVA LAB (IT)

SUMMARY

Oral presentations: 49 in 8 sessions, single track, no parallel sessions

Poster presentations: 10 in one session, Thursday 17 September, 10.15 - 11.00; posters on display from Wednesday morning

Duration of each talk: 15 minutes: 12 for the presentation, 3 for discussion

Countries represented: 16