16th SGA BIENNIAL MEETING
SHORT COURSE

Predictive Geometallurgy

One Day Short Course, March 26th

Held twice to consider different time zones:
Saturday March 26th New Zealand Time: 7:00 am and 8:00 pm

Recorded talks are available Friday 25th and will be discussed in the interactive session on 26th.

Participants: Minimum 5, maximum 20 participants morning and evening session each

SHORT COURSE DESCRIPTION
Geometallurgy aims to optimise the mineral value chain based on a spatially resolved, precise and quantitative understanding of the geology and mineralogy of the ores. Predictive geometallurgy goes beyond this by introducing forecasting models for ore behaviour and taking into account operational economics and global mineral markets.

The course is divided into two main blocks:

First, introductory presentations on advanced material characterization as well as current principles and applications of geometallurgy are pre-recorded and can be watched independently by the audience.

The second part of the course will consist of a live interactive session with time to discuss questions on the talks with the presenters. Its major goal is to enforce the concepts developed in the first part of the course through hands-on exercises using web-based apps.
This will allow participants to get a good feel for the data types common in geometallurgical programmes, and how they can be integrated into a geometallurgical model to be used in mine planning, scheduling and mine optimisation.

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SHORT COURSE SCHEDULE

Available pre-recorded Friday March 25th, to be watched independently by the audience		
Welcome	Sandra Birtel/HZDR-HIF	5 min
Introduction into Geometallurgy	Jens Gutzmer/HZDR-HIF	25 min
Advanced material characterisation		
New insights into raw material characterization brought by Spectral CT.	Marek Dosbaba & Wesley De Boever/ TESCAN	25 min
Advances in 3D mineralogy for ore body research	Rich Taylor/ZEISS	25 min
Semi-automated characterization of the 3D properties of particles (mineralogy + geometry)	José Godinho/HZDR-HIF	25 min
Geometallurgical modelling		
Geometallurgy: A general framework	Max Frenzel/HZDR-HIF	25 min
Understanding and predicting the behaviour of individual particles in mineral processing	Lucas Pereira/HZDR-HIF	25 min
Accounting for uncertainty in geometallurgical modelling	Raimon Tolosana Delgado/HZDR-HIF	25 min

***Interactive live session Saturday March 26th* 7:00 am and 8:00 pm**		
Discussion of pre-recorded talks		
7:00 am and 8:00 pm	Discussion on advanced material characterisation talks	Marek Dosbaba, Wesley De Boever, Rich Taylor, José Godinho
7:15 am and 8:15 pm	Discussion on predictive geomet talks	Raimon Tolosana Delgado, Lucas Pereira, Max Frenzel
Predictive Geometallurgy		
7:30 am and 8:30 pm	Introduction to hands on training	Raimon Tolosana Delgado, Lucas Pereira, Max Frenzel
8:00 am and 9:00 pm	Hands on training for geometallurgical modelling (data analysis, process prediction, deposit models)	Raimon Tolosana Delgado, Lucas Pereira, Max Frenzel
11:00 am and 00:00	End	Sandra Birtel

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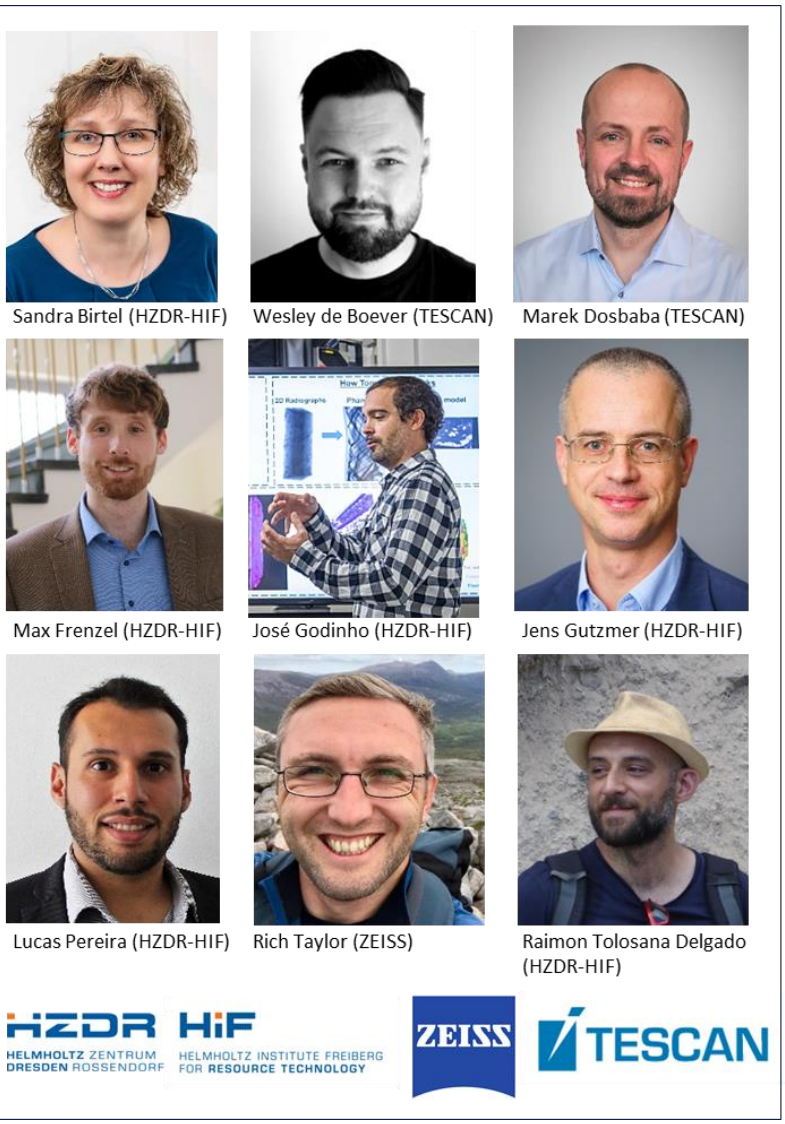
PRESENTERS

Sandra Birtel (Moderator) (HZDR-HIF)
Sandra's background is geoscience, she was active in basic research in Germany and France until 2010, also applying various SEM based techniques. Twelve years ago, she moved into the field of raw materials where she now works as a scientific coordinator with focus on geo-metallurgy at the Helmholtz Institute Freiberg for Resource Technology (HIF), a nationally-funded research institute that is part of the Helmholtz-Zentrum Dresden-Rossendorf (HZDR).



Wesley De Boever (TESCAN)
Wesley holds a Ph.D. in Geology, obtained as a researcher at the Ghent University Centre for X-Ray Tomography (UGCT). Wesley has over a decade of experience in conventional and dynamic micro-CT and its combination with other microscopy techniques such as optical and scanning electron microscopy.

Marek Dosbaba (TESCAN)
Marek is a Product marketing manager for microanalysis at TESCAN ORSAY HOLDING in Brno, Czech Republic. Marek joined TESCAN in 2013, initially working in the application group, and at the beginning of 2019 switched to the product group. He has a background in mineralogy and the application of microanalytical methods on geological materials (electron microprobe, Raman spectroscopy, CL.)

Max Frenzel (HZDR-HIF)
Max leads the Geometallurgy and Economic Geology Group at the Helmholtz Institute Freiberg for Resource Technology. His research focusses on different aspects of the mineralogy, geochemistry, and texture of base-metal ores, and how these affect mineral processing operations. He has actively contributed to the HIF's geometallurgy program for seven years.

José Godinho (HZDR-HIF)
José is an experimental geochemist interested in developing new methods to characterize Earth materials, especially using 3D imaging techniques. During his PhD at Stockholm University and Post-docs at Oak Ridge National Lab. and at the University of Manchester he focused his studies on understanding the time-dependent dynamic mechanisms of mineral dissolution and crystal growth. José also worked at the Diamond Light Source and have several months of synchrotron user time at different beamlines. In the past five years, he has specialized in developing new laboratory-based CT methods to characterize materials and in situ processes. In the last three years, he has worked at the HIF where he applied 3D imaging in the raw materials sector.

Jens Gutzmer (HZDR-HIF)
Jens is an economic geologist with expertise in a variety of commodities and mineral deposit types. Most of his recent research has focused on geometallurgy and mineral systems analysis. Jens is the founding director of the Helmholtz Institute Freiberg for Resource Technology, a nationally-funded research institute dedicated to raw materials research. He is a guest professor at the University of Johannesburg (South Africa) and a member of acatech, the Deutsche Akademie der Technikwissenschaften.

Lucas Pereira (HZDR-HIF)
Lucas is a geological engineer (Ouro Preto-BR) with master's degree in georesources engineering (Liège-BE, Nancy-FR, and Lulea-SWE), and ongoing doctoral research in particle-based separation models - machine learning applied to mineral processing understanding and prediction (Freiberg-DE). Lately, he became the leader of the particle-based modelling group at the processing department of the HIF.

Rich Taylor (ZEISS)
Rich completed a PhD in Experimental Petrology at the University of Edinburgh in 2009, before moving to Curtin University in Western Australia as a SIMS laboratory specialist. He subsequently held research positions in the School of Earth and Planetary Sciences at Curtin studying geochemistry and geochronology, specialising in imaging and microanalysis. In 2017, he moved to the University of Cambridge to study magnetic inclusions in Earth's oldest materials using novel microscopy techniques. In 2019, Rich moved to Zeiss based in Cambourne, UK to take on the global Geosciences Applications Development role.

Raimon Tolosana Delgado (HZDR-HIF)
Raimon is an engineering geologist and PhD in environmental physics and technology, working the last twenty years in geostatistics, compositional data analysis and other tailored data analysis and modelling methods for the geosciences. He has been at the HIF for nine years contributing his mathematical and statistical expertise to the development and extension of predictive geometallurgy.

FEES: $140 for members, $180 for non-members, $70 for student or retired members and $90 for student or retired non-members. Register at https://confer.eventsair.com/sga2022/registration

ORGANIZER and CONTACT:
Helmholtz-Zentrum Dresden-Rossendorf (HZDR), Helmholtz Institute Freiberg for Resource Technology (HIF), Sandra Birtel, email: s.birtel@hzdr.de; Max Frenzel, email: m.frenzel@hzdr.de

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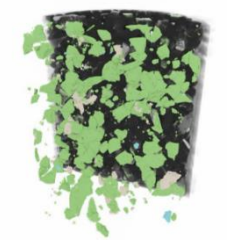
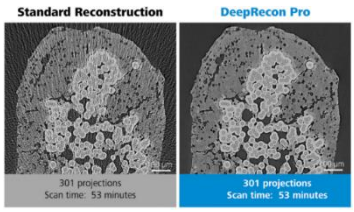
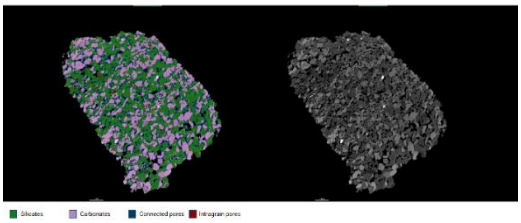
ZEISS: CT image



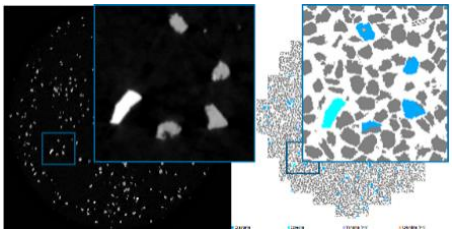
Standard reconstruction



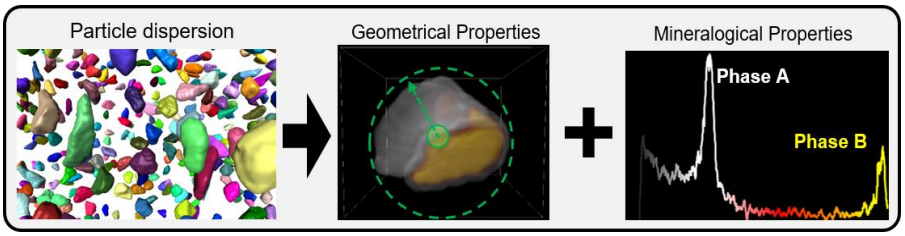
TESCAN: Comparison of micro-CT image with TIMA data



Demonstrating segmented micro-CT image



HIF: 3D Particle properties



HIF: Prediction of material behaviour