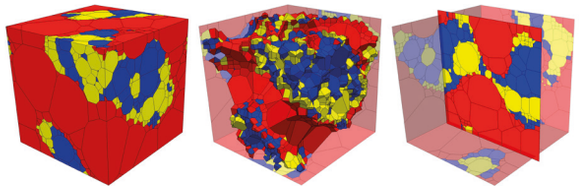
OUR ACTIVITIES

We applied predictive geometallurgy to fine-grained polymetallic skarn ores from the world-class tin deposit Hämmerlein-Tellerhäuser in the German Erzgebirge. These ores were previously thought to be not suitable for beneficiation.

In a pilot test coordinated by HIF, European partners from research and industry reduced the amount of feed material for physiochemical processing by more than 20 percent by XRT (X-ray-transmission) sensors for pre-sorting. In the consecutive steps around 60 percent of the tin-bearing mineral cassiterite, 70 percent of zinc sulphides and other by-products such as indium were recovered.



Reconstruction of 3D structures based on 2D images

WHO WE ARE

HIF is a leading, multi-disciplinary research institute in Europe dedicated to develop innovative technologies and systems for the energy and resource efficient exploration, beneficiation and recycling of mineral and metalliferous raw materials. The advance of novel platforms and tools needed for resource characterization, geospatial modelling, process and system simulation are an integral part of our research.

As Helmholtz Institute Freiberg for Resource Technology, we belong to the Helmholtz-Zentrum Dresden-Rossendorf, which is one of 19 research centers within the Helmholtz Association - Germany's largest scientific organization.

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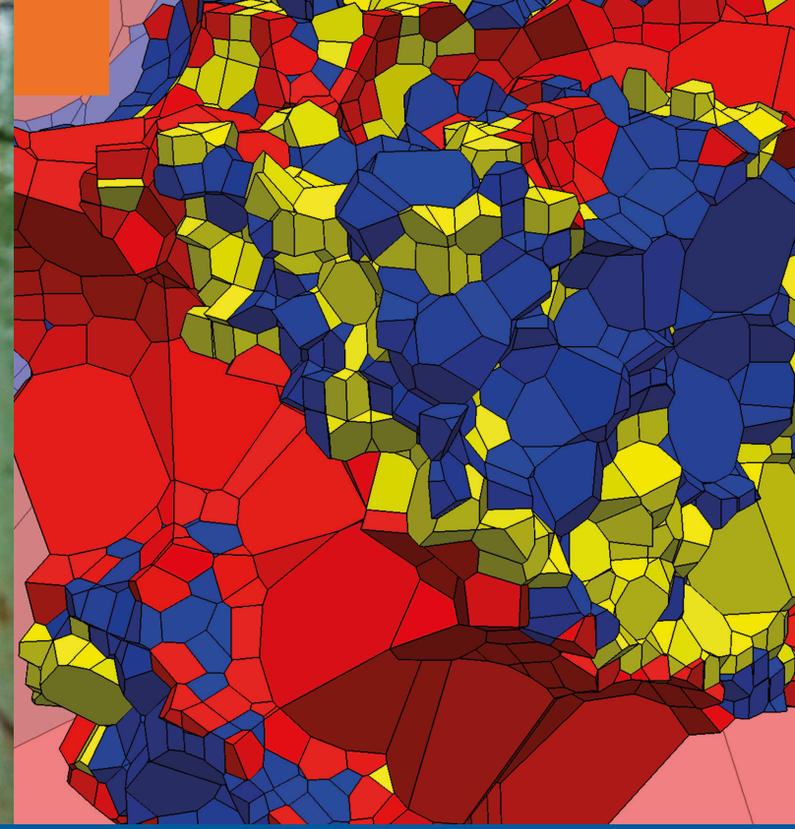

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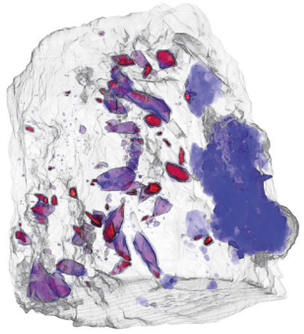
PREDICTIVE GEOMETALLURGY

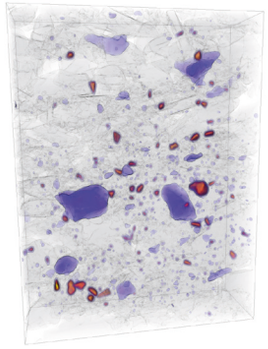
OUR STRENGTHS

We optimize mineral extraction and beneficiation operations with dynamic processing models as well as detailed understanding of raw materials composition and microstructure. This integrative geometallurgical approach allows for:

- A more reliable prediction of recovery rates and optimum processing parameters
- The selection of optimal energy and resource efficient processing routes to maximize economic value
- Near zero-waste mining concepts to minimize environmental footprint and increase social acceptance



3D image of a rare earth (red) bearing carbonate rock



Particles (<1 mm) from the same rock after comminution

OUR FOCUS

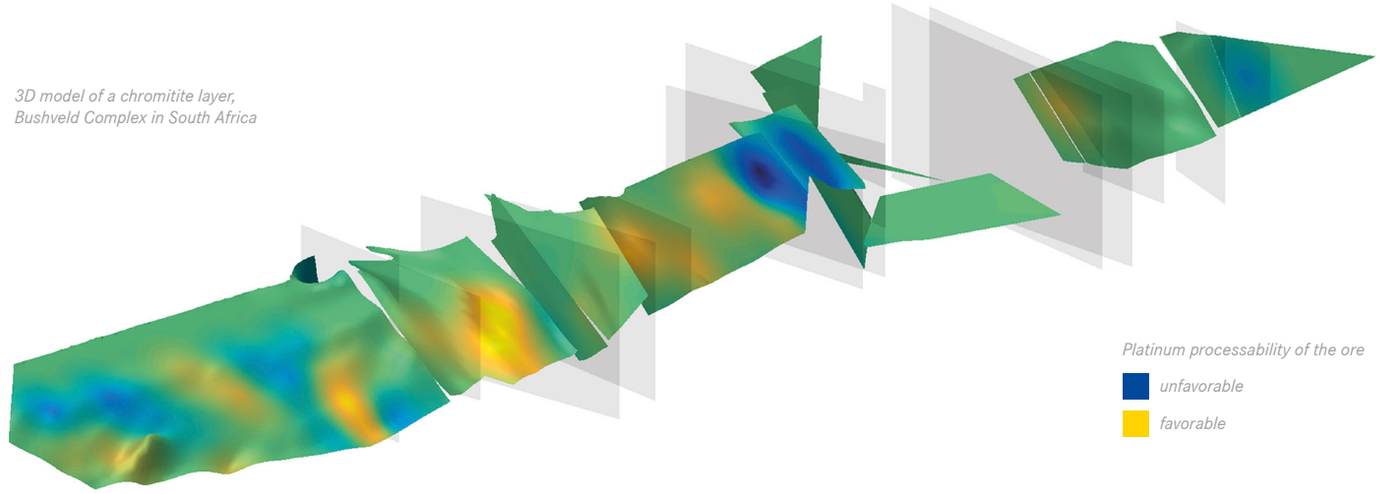
Integrative ore characterization

- Drill-core mineral mapping using hyperspectral and high-resolution mineralogical data fusion from an early exploration stage on
- Multi-scale characterization from bulk chemistry to 3D automated mineralogy
- Process mineralogy via automated mineralogy and sound data analysis

Geometallurgical ore models

- 3D microstructure modelling for grinding forecasts
- Geostatistics beyond grade – from assays to geometallurgical parameters
- Uncertainty based risk assessment, from geological to market risk

3D model of a chromitite layer, Bushveld Complex in South Africa



Advanced forecasting of minerals processing

- Complete use of quantitative particle information to predict mineral processing outcome
- Data mining and deep learning methodologies for process forecasting, easily adaptable to any commodity, from pre-feasibility studies to production
- Integration of 3D particle characterization data for more robust process prediction

Adaptive processing

- Optimal design of dynamic processing routes, adapting on the fly to ore variability
- Optimal, dynamic sensor selection for sensor-based sorting with automated mineralogy data
- Real-time mining: updating resource models and dynamic mine planning and scheduling