

## Multiscale analyses

cm	ViP	Virtual Petrography
mm	$\mu$ -CT	Micro Computed Tomography
	BIB-SEM	Broad Ion Beam milling & Scanning Electron Microscopy
nm	LMI-BIB-SEM	Liquid Metal Injection - BIB-SEM
	Cryo-BIB-SEM	Cryogenic Ion milling & Cryo-SEM
	FIB-SEM	Focused Ion Beam milling & SEM
	TEM	Transmission Electron Microscopy

Our state-of-the-art facilities enable material analysis and advanced **image processing at gigapixel resolution**. Using various data sources, MaP's multiscale and multimodal data integration enables analysis of materials from centimeter down to nanometer scale. This enables **fast, exact segmentation** and determination of features such as **pore shape and size, pore connectivity, phase distribution, microscopic contact angles** & more, providing high-quality insight into the microstructure of each sample.

## Software

**MaPro** is an **automated, multiscale** and **multimodal image segmentation** and analysis software specially for **nanometer to centimeter-scale** features. It enables customers to **achieve results quickly** after modest training, saving hundreds of hours over manual processing of the same data. Initially developed for characterizing heterogeneous rocks, it is **used on a wide array of materials**, including research in life science and materials science.

## Consulting

MaP offers **consulting on material science and -characterization projects**, with extensive industry experience especially in **oil- and gas exploration** as well as **subsurface storage** applications. A combined **30 years of projects** make **MaP** a trusted partner for challenging microstructural analysis projects. MaP also offers to **set up or improve in-house microstructural labs**, from requirements gathering through vendor selection to training.

## About MaP - Microstructure and Pores GmbH

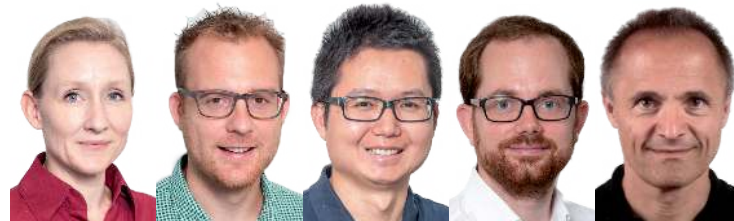
We understand our customers' goals and support them on the way to success! Working across industries and with many preparation and imaging technologies, from established to cutting-edge, we know how to extract the insights you need. Our researchers have over thirty years of experience in their fields, making our lab one-of-a-kind in the world. We are ready to work with our partners to reach your objective across industries and fields of science.

## Materials

Shale	Batteries	Ceramics	Biofilms
Mudstone	Coatings	Water	Fibers
Carbonate	Bentonite	Soil	Tissue
Sandstone	Wood	Oil	Bone
Salt	Glass	Lipids	Tooth
Granite	Polymers	Paint	Blood
Cement	Food	Bacteria	Implants
Plaster	Organic mat.	Capillaries	...

## Contact us

If you are interested in what MaP can deliver to help your development, research or production process, or you are looking for support in unleashing the full capabilities of your own lab, contact us today!



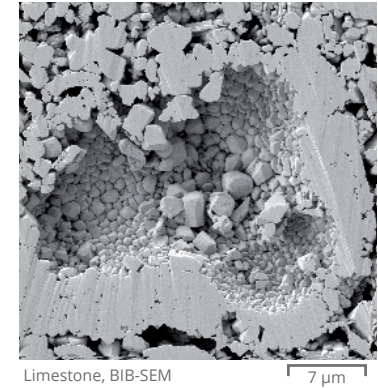
Dr. Joyce Schmatz	Dr. Jop Klaver	Mingze Jiang	Moritz Süß	Prof. Dr. Janos Urai
Microstructures in wet rocks and soft matter	Microstructures of tight rocks	Algorithmic Image analysis & Software development	Sales and Business Development	Chair of Structural Geology, Tectonics and Geomechanics, RWTH Aachen University
Cryo-BIB-SEM Microanalytics	BIB-SEM Metal injection methods			
+49 241 80 98445				
<a href="mailto:info@m-a-p.expert">info@m-a-p.expert</a>				
<a href="http://www.m-a-p.expert">www.m-a-p.expert</a>				

MaP - Microstructure and Pores GmbH · HRB 20536 · USt-ID-Nr. DE306972825  
Amtsgericht Aachen · Geschäftsführung: Dr. Joyce Schmatz, Dr. Johannes Klaver



m-a-p.expert  
info@m-a-p.expert  
+49 241 8098445

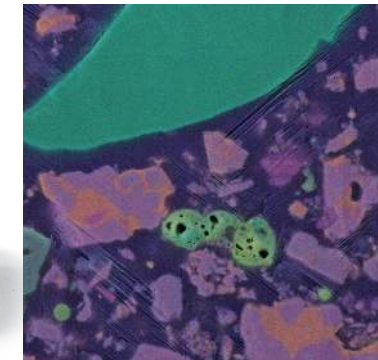
## Geoscience



Limestone, BIB-SEM

7  $\mu$ m

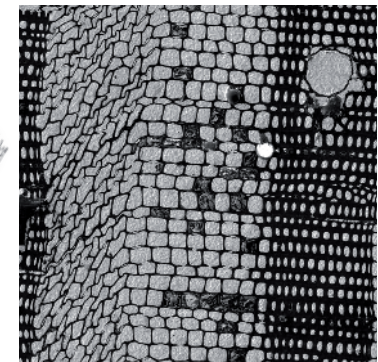
## Materials science



Cement, Cryo-BIB-SEM

20  $\mu$ m

## Life science



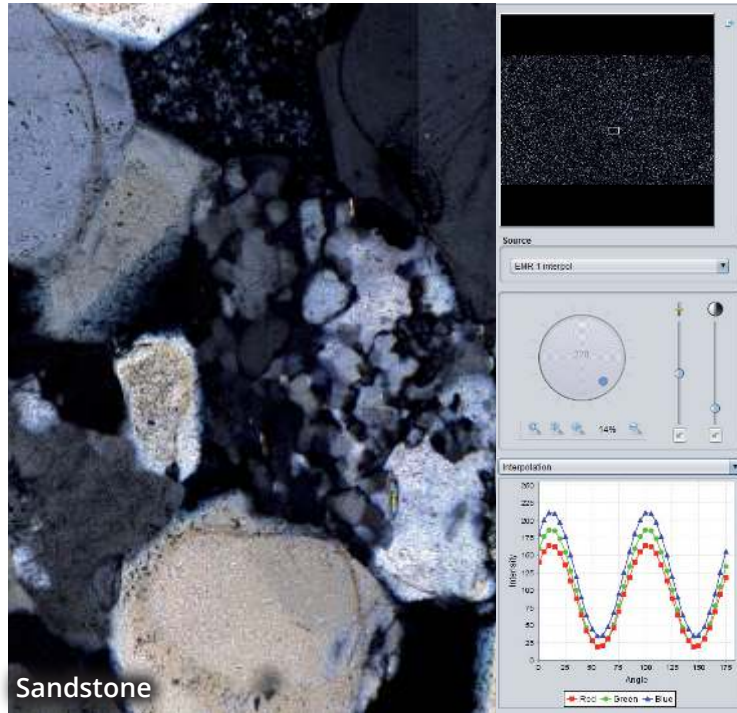
Wood, LMI-BIB-SEM

60  $\mu$ m

## Microstructural pore space analysis

For high-resolution microstructural analysis at representative scale of heterogeneous materials, such as rock samples, MaP uses Broad Ion Beam (BIB) milling with Scanning Electron Microscopy (SEM) imaging. The ion-milled surface enables Gigapixel image mapping at nano-scale resolution of undamaged microstructures followed by image processing and statistical analysis of pore and grain geometries and its chemical compositions.

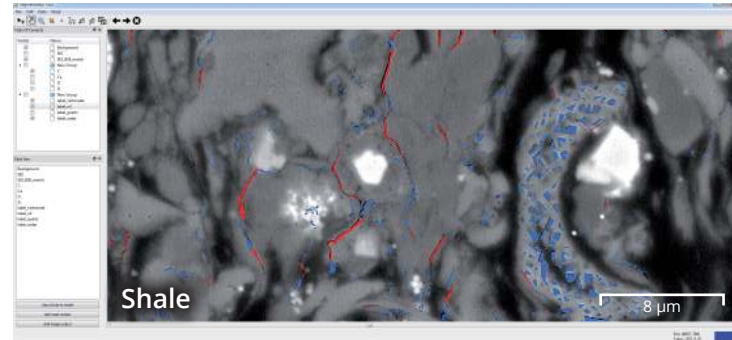
### Petroscan Tileviewer



## Automated petrography

Virtual optical microscopy (ViP) displays acquired mosaic images of thin-sections with 10 nm accuracy at all settings of a conventional polarizing microscope. Studies can combine ViP with BIB-SEM, allowing offline and remote assessment of annotations. This enables a new way of collaborating and the sharing of expertise. In multi-scale automated petrographic analyses MaP can reliably segment fracture networks, minerals, pores and mineral overgrowths.

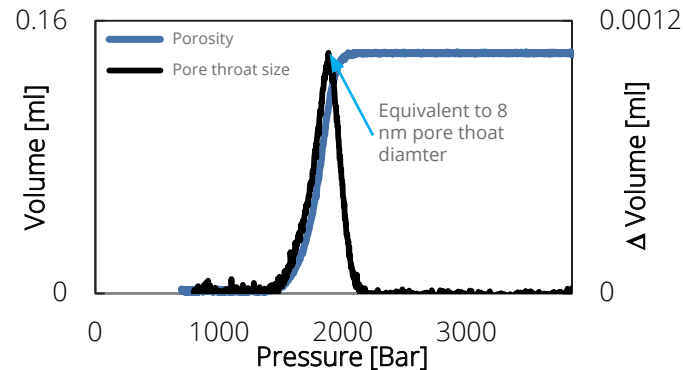
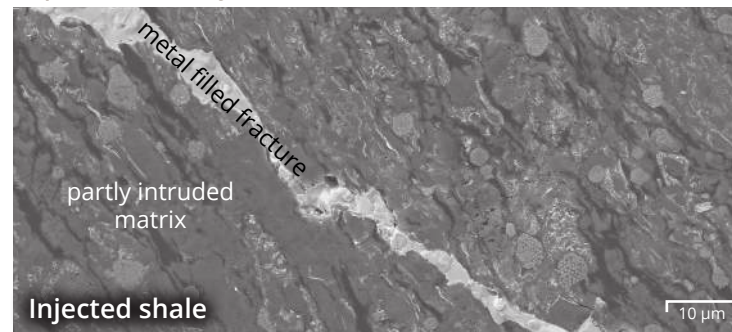
## MaPro (BIB-SEM)



## Pore connectivity analysis

Our Liquid Metal Injection (LMI)-BIB-SEM method measures 3D pore connectivity and percolation threshold for porosity and permeability assessments. LMI complements Hg-Posorimetry (MIP), providing intrusion data but additionally visualizing the actual intruded pore space. True porosity can be distinguished from artifacts, correcting e.g. for core damage. It can be applied on porous material with sub-micrometer pore throats for analyses.

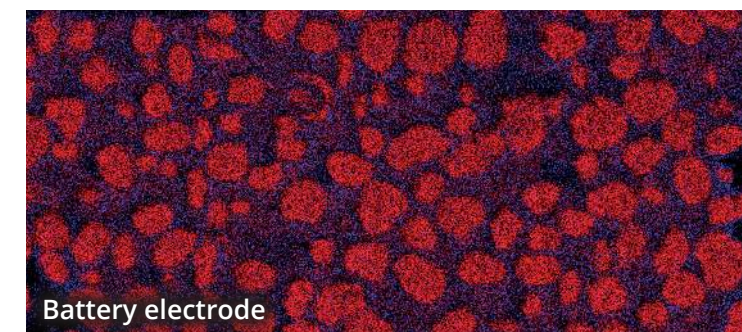
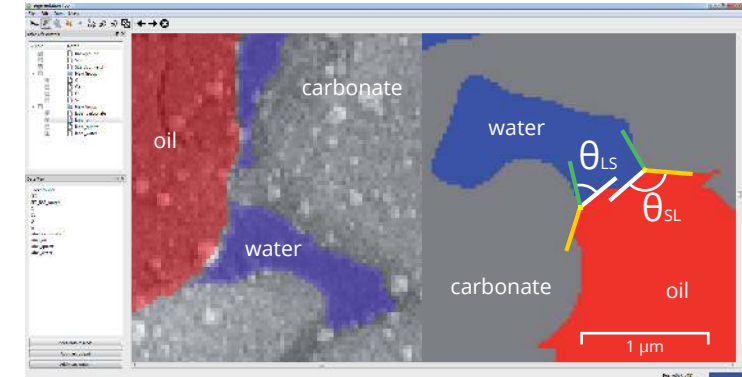
## Liquid Metal Injection



## Pore fluid analysis

Our unique cutting-edge Cryo-BIB-SEM method allows the imaging and investigation of cryogenically stabilized pore-fluids and measuring via a FluidMap the direct in-situ fluid chemistry, wettability, fluid distribution and -saturation. This methodology opens new fields of research such as EOR screening or core and formation damage evaluation on fresh samples, such as cuttings and enables studying sensitive materials such as soils down to the nm-scale.

## MaPro (Cryo-BIB-SEM & contact angles)



## Soft matter analysis

Combining Cryo-Broad Ion Beam sputtering with Cryo-SEM and chemical analysis using EDS we image and analyze cryo-preserved fluids inside pore networks and micro cracks. Cryo-loading and a Cryo-saw allow sample preparation under LN2 conditions enabling investigation of wet, heterogeneous geological materials such as clays and reservoir rocks, sensitive and soft materials such as tissue, polymers and medical/biological preparations.