

# INTERPORE FlashNews

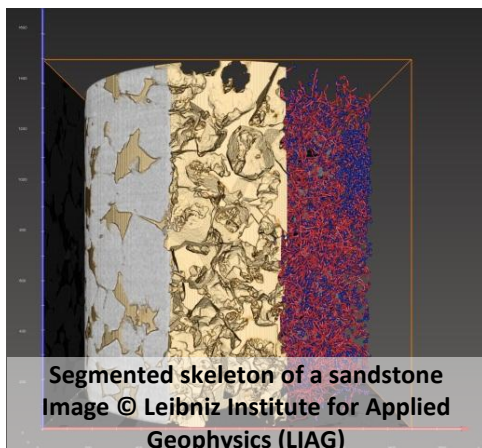
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## Visualization Sciences Group (VSG) joining InterPore as Institutional Member

Visualization Sciences Group (VSG), a leading provider of advanced 3D imaging software for the analysis of natural and industrial materials, has joined InterPore with an institutional membership. In this FlashNews issue, we are introducing VSG and their key software products to the InterPore community.

“The users of VSG's Avizo® software products carry out research in fields as diverse as petroleum and mining, electronics, semiconductors, civil engineering, or food technology, and have a strong interest in the concept of porous media,” explains Pascal Doux, Product Director at VSG. “The cross-disciplinary field activities of InterPore naturally lead our team to become members of this international network. As 3D imaging is becoming a critical tool in visualising, analysing and modelling porous media, it is essential for us to be in the heart of emerging discussions that help understand researchers' challenges and the growing applicability of porous media in engineering and science.”

VSG's key product for most InterPore members is the 3D imaging software Avizo®. It supports complex analytical processes, from 2D/3D imaging to simulations, and the prediction of natural and industrial material properties.



Segmented skeleton of a sandstone  
Image © Leibniz Institute for Applied  
Geophysics (LIAG)

Avizo is used by investigators for interpreting the results of CT-scan, micro- and nano-CT, Electronic Microscopy, MRI, etc. It gives insight into the details of properties on full 3D structures at any scale and size. Using powerful volume rendering, segmentation, 3D reconstruction and quantification tools, Avizo enables researchers to perform interactive exploration and visualization. It allows the extraction of large amounts of qualitative and quantitative information, based on which physical parameters such as porosity, connectivity, and absolute permeability can be calculated.

### Imprint

InterPore FlashNews are issued up to once per week by the International Society for Porous Media ([www.interpore.org](http://www.interpore.org))

Small news items on a short notice are welcome. Please submit articles to [newsletter@interpore.org](mailto:newsletter@interpore.org).

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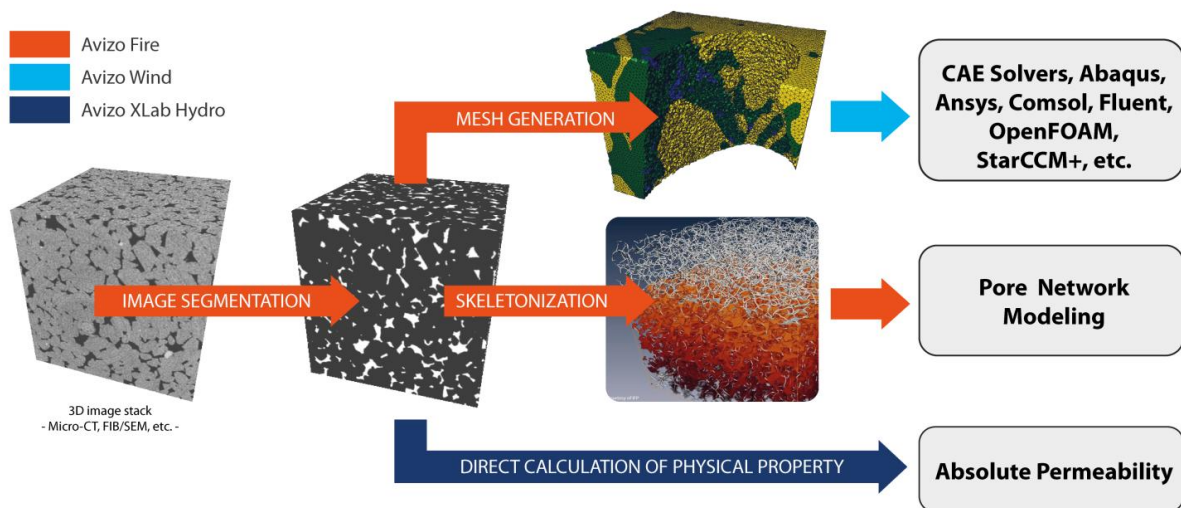




The oil and gas industry and chemical engineering shall serve as examples for the application areas of Avizo.

In the oil and gas industry, Avizo supports research on experimental characterization and modelling of multiphase flow in porous media. Avizo can extract and analyse the pore network of rock samples from 3D images. It uses a well-designed workflow with many specific image processing modules. The skeletonization module, for instance, is particularly suited to extract the essential features of the pore space geometry and topology. It provides a simplified network with a local measurement of the minimum diameter at each point of this skeleton.

In the field of chemical engineering, convective heat transfer in reticulated porous media involves the formulation of complex flows and temperature fields, preventing the extraction of exact and comprehensive analytical solutions. Avizo can generate 3D representations of reticulated porous foams from MRI and CT-



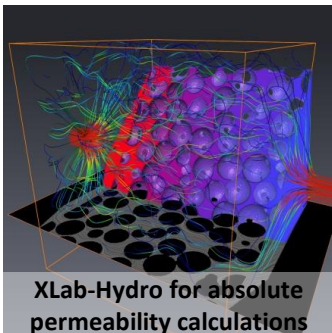
**Image-to-simulation workflows in Avizo**

scans. Surface reconstruction of an object from 3D images, when used in CFD studies, can help accurately capture the velocity and temperature fields, and quantify the fluid and heat transport within the porous media. Avizo's mesh generation module allows the user to generate a volumetric grid within the object which is imported directly into the CFD software, rather than using a separate external gridding program.

Recently, VSG released a new Avizo module called XLab-Hydro, a virtual permeameter for calculating the absolute permeability of porous media samples. It can simulate permeability experiments and then calculate the intrinsic permeability tensor of a material sample, directly from 3D discrete images. Thus, Avizo XLab-Hydro provides accurate and solid estimates of absolute permeability - even on extremely small samples at micro- or nanoscopic scale - without complex physical experiments.

The logo for INTERPORE FlashNews features a stylized blue and black geometric icon on the left, followed by the word "INTERPORE" in large, bold, black capital letters, and "FlashNews" in a smaller, blue, sans-serif font to its right.

Avizo can address specific 2D/3D data visualization and analysis needs for analytical processes in various application areas. Users have the possibility to customize and expand the software, e.g., by adding new file readers and writers, integrating custom computation routines, developing new visualization modules, and by implementing routine workflows for 2D/3D image analysis and characterization. “Avizo’s expandability makes it an ideal open framework for research centres, consulting organisations and solution developers that need rapid software customization to address specific application areas”, summarises Pascal Doux.



VSG’s strong partnerships with research institutes allow the prototyping – and even release – of new technologies ahead of the market. For instance, several projects were carried out in partnership with the **ICMCB-CNRS laboratory** in Bordeaux (France). Their research often requires novel high-performance techniques to visualize and process scientific data. This partnership resulted in the new Avizo XLab-Hydro module (see above), and in novel GPU computing techniques to tremendously reduce the pre-processing time of very large micro-tomography data sets before visualization.

Partnerships, whether long-term or for immediate specific developments, significantly contribute to VSG’s growing knowledge base about porous and other media, and thus allows the team to develop better and newer tools for visualising and analysing natural and industrial materials.

“To us, Innovation is not a stand-alone concept. It tightens connections within the scientific and engineering community, and the set-up of working groups that discuss and generate ideas, technologies and solutions from complex challenges and situations”, says Pascal Doux. “We joined InterPore, because its network helps fuel such cooperation and discussions, regardless the discipline”.

[www.vsg3D.com](http://www.vsg3D.com)