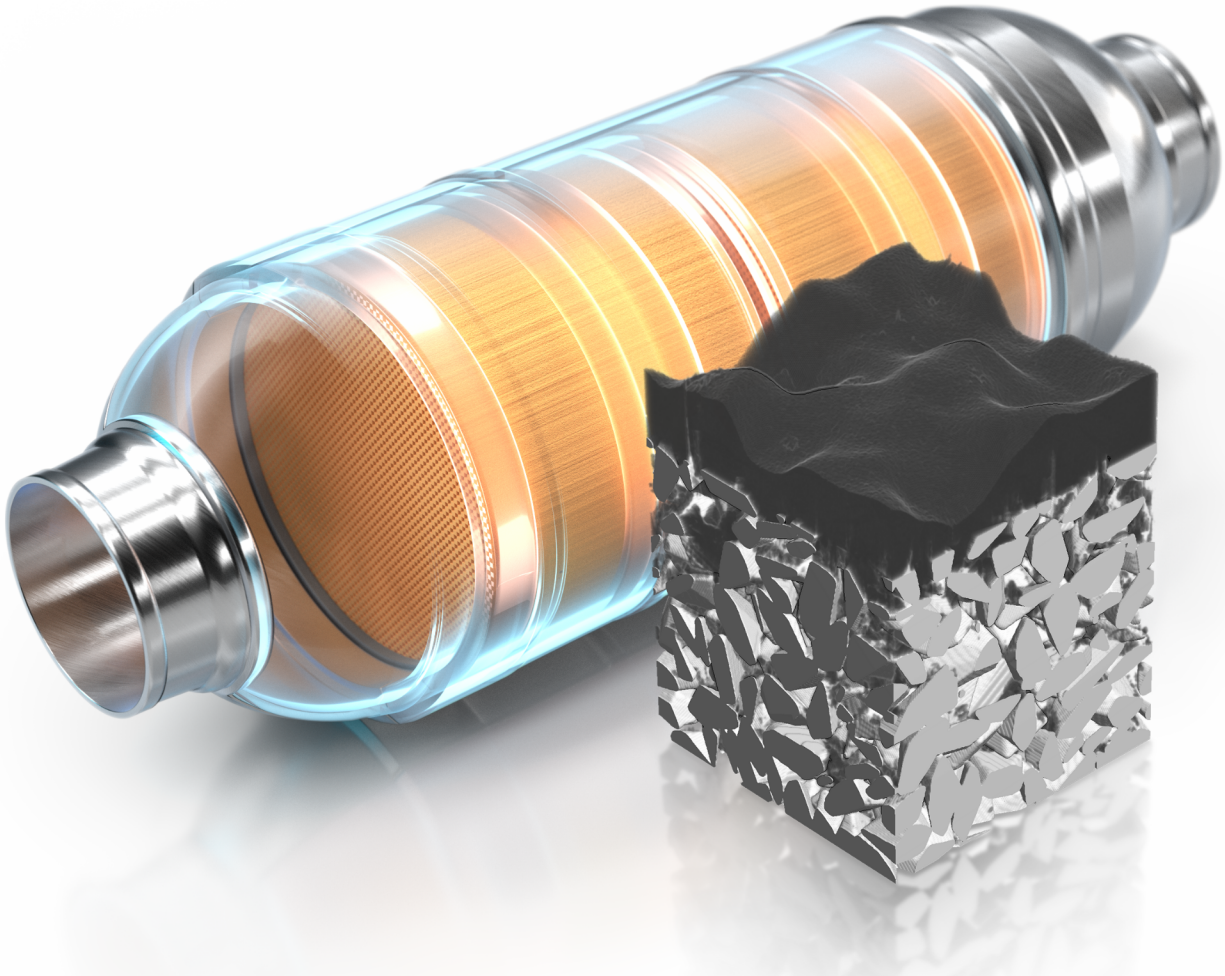
GeoDict

The Digital Material Laboratory

Soot Filtration



The Motivation

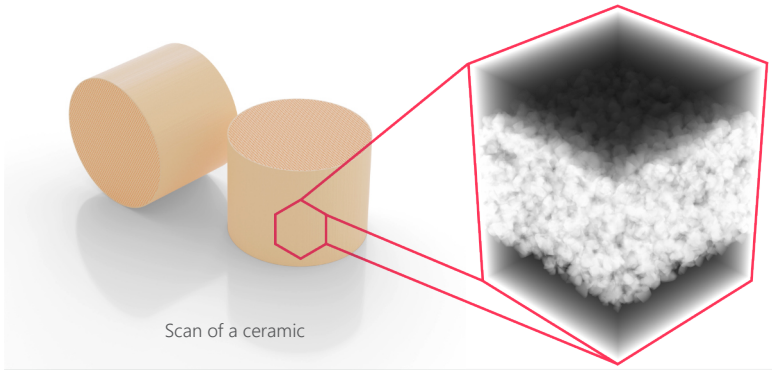
Soot filtration simulations provide a useful method to test the effects of various scenarios and conditions on the performance of soot filtration systems. By modeling complex processes and interactions, problems can be identified and addressed early, leading to more effective optimization of the system for different designs and conditions. This ultimately leads to finding the ideal solution for a given application.

Our Solution

GeoDict simulations assist manufacturers of filter media and filters in understanding their existing materials, which enables them to make targeted improvements. This understanding leads to both efficient improvement of existing materials and the development of new materials. GeoDict covers the complete development process, including analysis of the filter medium, prediction of physical parameters, and design of new performance materials.

Your Benefit

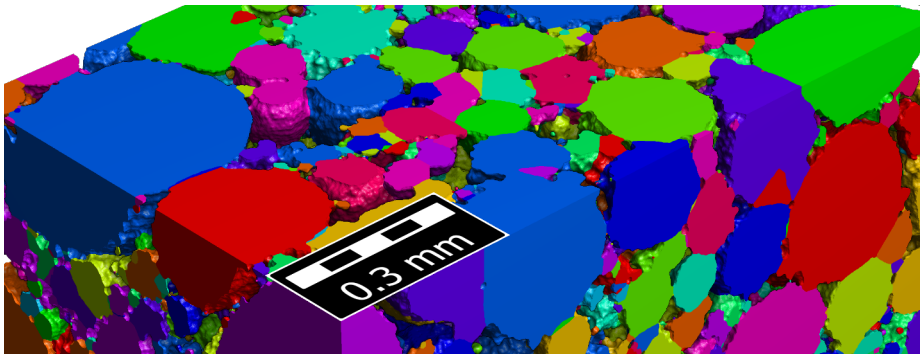
Computer simulations are used to develop new filter media and filter elements by selecting a few promising designs and reducing costly laboratory testing to these few designs. The development cycle can be significantly accelerated by parallelized parameter studies, empowering faster and better products – saving material and time to market.



Scan of a ceramic

Digitalization

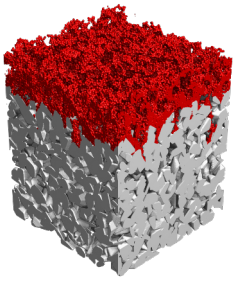
Import a µCT scan of the filter material or a CAD model of the filter. Image filters and AI tools help segmenting and identifying useful information.



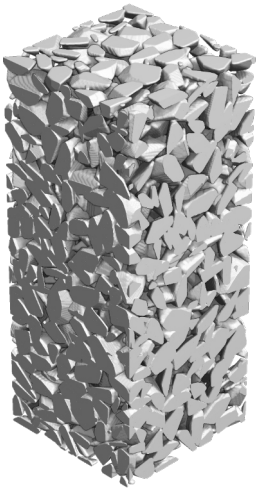
Material Analysis

Analyze µCT scans to determine properties such as initial pressure drop, pore size distribution, bubble point, and permeability of the material. This helps evaluating its performance for various applications, like filters and catalysts.

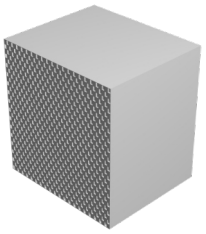
Lead zirconate titanate ceramic



Diesel/Gasoline Particulate Filter (DPF/GPF)



DPF ceramic



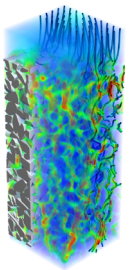
Honeycomb model

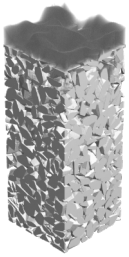
Microstructure Design

Design the microstructure of the material with the GrainGeo module and honeycomb structures using the GridGeo module.

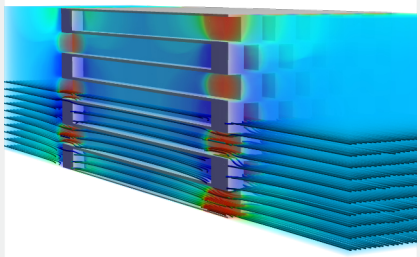
Analyze filtration performance with FilterDict:

- Simulate soot particle filtration with individual particle size distributions
- Evaluate loading curves over time using single-pass or multi-pass tests





- Generation of square- and triangle-shaped honeycombs
- Fully customizable geometrical parameters
- Flow and filtration simulations through honeycomb geometry



Property Prediction

Simulation of filtration-relevant properties of filter media, filter elements, and filters with housing such as initial pressure drop, initial filter efficiency, pressure drop vs. time, fractional filtration efficiency vs. time, dust holding capacity.

GeoDict offers a cloud solution to conduct extensive parameter studies to evaluate the impact of specific parameters on the overall filter media performance.

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