



MATERIAL SOLUTIONS FOR

MEMBRANES & FOAM FILTERS

ADVANCED CERAMICS

ENGINEERING THE FUTURE
WITH SUSTAINABLE SOLUTIONS.



INTRODUCTION AND APPLICATIONS

The use of ceramic materials in the wide field of “filtration” has its own specifics.

Our raw materials are used in

- **ceramic membranes** for pharma/chemicals, wastewater and oil/water separation
- **ceramic foam filters** used in molten steel, aluminium and iron casting
- **catalyst supports and diesel particle filters** for industrial and automotive industry

We design our raw materials to meet required final product's properties (flexural strength, porosity, thermal behaviour, etc.) and to be compatible with shaping processes, e.g., extrusion and impregnation method.

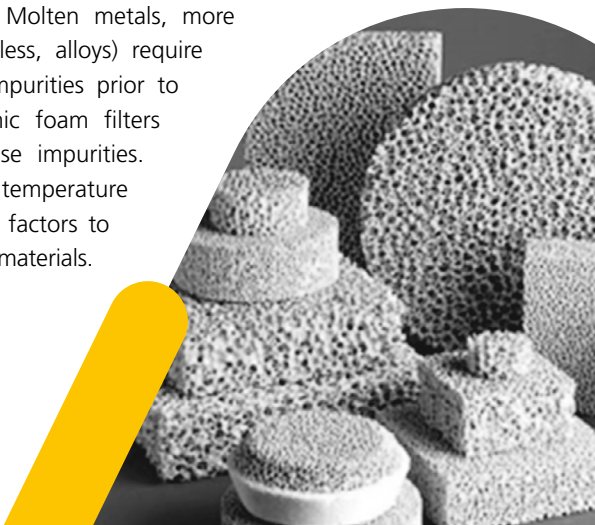
SPECIFIC APPLICATION EXAMPLES

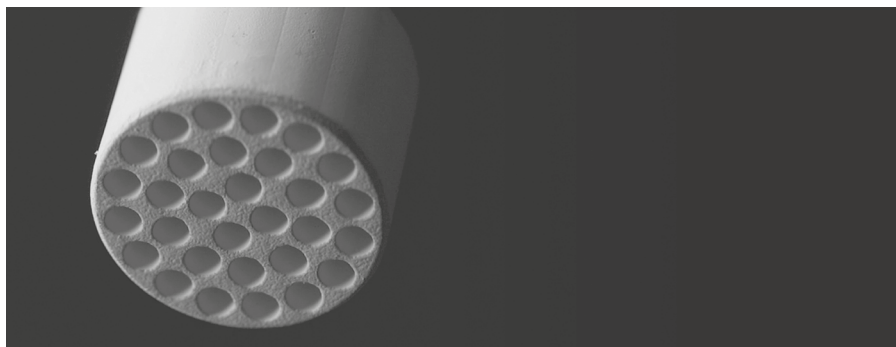
Ceramic membranes for liquid/solid or liquid/liquid separations are preferably used in water & oil separation, pharma, chemical and industrial & public wastewater treatment. These types of membranes are of a complex structure with a support, an intermediate and a filtration layer.

Depending on the separation requirements, the materials design has to be optimized for size and shape, working pressures, temperatures, cycling rates, pH and corrosion resistance.

Aluminas are widely used due to their workability at low and high temperature, at pH of 0-14 and at relatively low cost. Coarser white fused aluminas will make up the support layer enabling the desired porosity. Fine and very fine aluminas or zirconia powders will find their place in the intermediate and filtration layer.

Ceramic foam filters represent another area where we supply a variety of Zirconias and Aluminas. Molten metals, more specifically aluminium and steel (stainless, alloys) require a purification from solid and liquid impurities prior to casting to avoid part defects. Ceramic foam filters are the best solution to remove these impurities. Thermal shock resistance, operational temperature and corrosion resistance are important factors to consider when selecting ceramic raw materials. Processability will be of importance too.



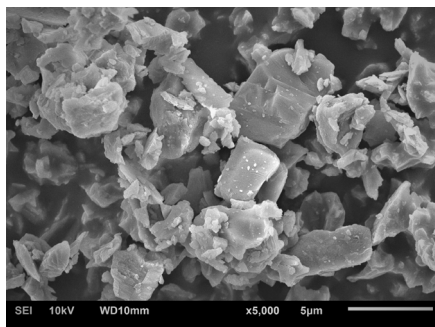


OUR OFFER

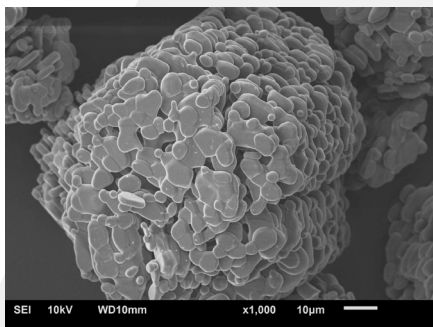
Our main raw materials for membranes & foam filters can be **supplied from our plants in Germany, China, Switzerland and the USA**. Most widely used are **ZIONIC Zirconia** and **ALODUR Alumina**. Further products are our **Calcined Alumina EVT**, **TECO-SIL Silica** and **TIMREX graphite** that is used as pore former. Imerys also offers certain natural minerals that may be used as binders.

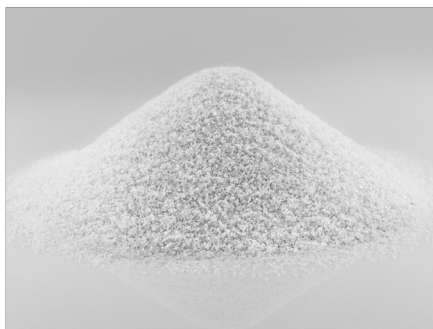
Our **Fused Alumina** and **Calcined Alumina in ceramic membranes** are today mainly used for support layers. The major products are fused alumina ZWSK F2000, ZWSK F1000 and ZWSK F400 as well as Calcined Alumina EVT304, 404 and 500. These are all ideal for extrusion and feature tight control of PSD, morphology and purity.

ZWSK F2000



EVT 500



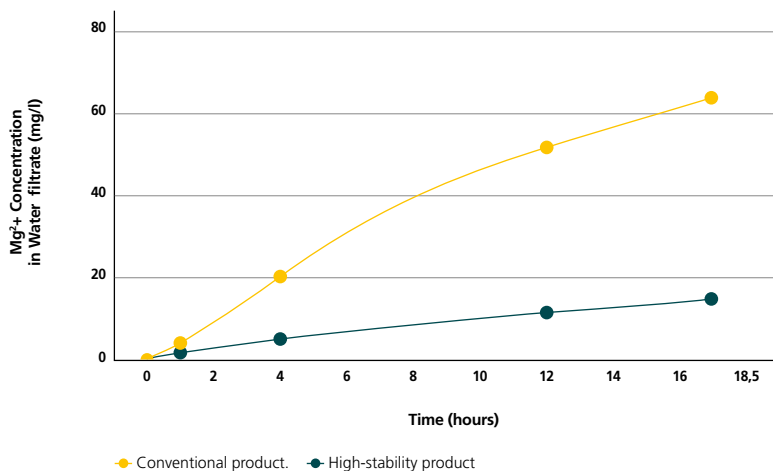


Fused Alumina ingots and lumps are processed into micrometric sized powders using proprietary advanced technologies

Our **MgO Zirconia for ceramic foam filters** is characterized by its high stability in aqueous slurries, and a consistent shrinkage due to a tight control of particle size distribution and good sintering properties. To maintain high productivity and impregnation homogeneity, soluble Mg^{2+} ions must be avoided.

We master the processing of suitable MgSZ that allows our customers to achieve slurry stability and cost effective production.

Behaviour of our MgO Zirconia -325# SP high stability in a slurry during foam filter production

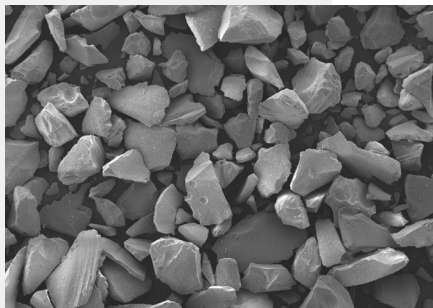




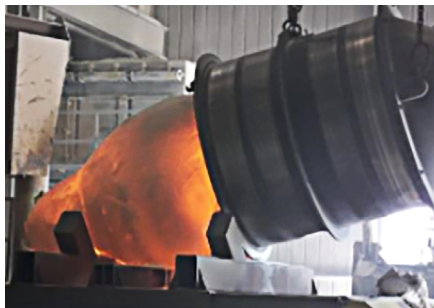
Example of one type of arc furnace

In addition to above, our zirconium chemicals such as **Zirconium Oxychloride (ZOC)** and **Zirconium Basic Carbonate (ZBC)**, also covered under the ZIONIC brand, have found their use in a number of applications. The purity of these materials make them a product of choice as active contributing component for the production of Cerium and Lanthanum based catalysts in the automotive industries

Apart from our supply of ZIONIC Zirconia products, where we start from the early stage of processing zircon sand, there are a variety of materials tailored and sold for catalysts & particle filters. Our ability to offer many sizes of cordierites and fused silica help the continuous improvements. Furthermore, as a group, we offer kaolins and clays from multiple locations.



SEM picture of a fused silica



Fused Silica production

OUR TYPICAL PRODUCTS

			ZIONIC™		
			YSZ	MgSZ	ZrO ₂
Applications	Ceramics membranes	Support layer	✓		✓
		Intermediate layer	✓		✓
		Filtration layer			✓
		Others			
		Ceramic foam filters	✓	✓	✓
		Catalyst support & diesel particle filters			
		Others			
Products	Product category		5% Y Zirconia HP 7% Y Zirconia SP 8% Y Zirconia HP 13% Y Zirconia HP	MgO Zirconia SP high stability	Monoclinic Zirconia SP Z99 ZCO-FC ZCO-RA
	Size category		-1µm -2µm -5µm other	3µm -325#	-1µm -2µm -5µm 6µm 7-9µm -325# -200# -100#
Basic product information	Fused & crushed type		✓	✓	✓
	Spherical type				
	Other type (calcined, chemical,...)				
	Primary crystal size (for Al ₂ O ₃ s) or grain size (for others)				
	Typical soda content				
	0.3 to 2µm		✓		✓
	2 to 5µm		✓	✓	✓
	5 to 10µm		✓		✓
	>10µm		✓	✓	✓

Others: cordierite, kaolin, diatomite, bentonite,...

			ALODUR®			TECO®	TIMREX®
Chemical Zirconia	ZOC	ZBC	Calcined Al ₂ O ₃	Fused Al ₂ O ₃	Tabular Al ₂ O ₃	Fused SiO ₂	Graphite
			✓	✓			
			✓				
			✓				
							✓
✓			✓	✓	✓		
	✓	✓				✓	✓
✓	✓	✓			✓	✓	✓
ZRO elec	ZOC 35% ZOC 36%	ZBC-Catalyst ZBC-AP ZBC-Paper	EVT	ZWSK WSK WRG WDCF EK S1 EK S2	ALUTAB	TECO-SIL TECO-SPHERE	TIMREX KS4 TIMREX KS6 TIMREX KS15
1.5µm 3-5µm -325#		ZBC-AP	304 404 500	F2000 -325# F400 F220 other	-325# other	-325# -200# -100# other	4µm 6µm 15µm
				✓		✓	
						✓	
✓		✓	✓		✓		✓
			~2.8µm ~4.0µm ~4.9µm				
			~0.06%				
✓			✓	✓			
✓			✓	✓		✓	✓
				✓		✓	✓
✓			✓	✓	✓	✓	✓



THE WORLD'S LEADING PROVIDER OF MINERAL-BASED SPECIALTIES FOR INDUSTRY

Imerys offers high value-added solutions to many different industries, ranging from process manufacturing to consumer goods.

- We provide innovative and quality products to fit with our customers' needs
- We consider Safety as a priority
- We respect the world in which we operate



Over 15,000
customers



Sales in 142
countries



16,300
employees

At Imerys, we fulfill our role in society in a responsible way.

The technical expertise and innovative mindset of our people enable us to extract and transform minerals responsibly and in a sustainable way over the long term.

For further information, please contact :

IMERYS

advanced.ceramics@imerys.com

www.imerys.com