



MATERIAL SOLUTIONS FOR

SENSORS & ENERGY CONVERTERS

ADVANCED CERAMICS

ENGINEERING THE FUTURE WITH SUSTAINABLE SOLUTIONS.

OUR OFFER

Our main raw materials for sensors & energy converters are **largely supplied from our plants in Germany a nd China.** Most commonly supplied are **ZIONIC**[™] **Zirconia**, **ALODUR® Alumina** and **Calcined Alumina EVTs**. They are fused & crushed as well as calcined powders and some made via a chemical process.

The fused Zirconia products are partially and fully stabilised and feature a range of micron & sub-micron powders. Their low surface area makes them preferred for injection molding and tape casting.

Powder morphology



SEM of fused YSZ powder

Degree of stabilization of fused YSZ powders

Looking at mechanical properties and ion conductivity we have several options for engineering towards customer needs. Adjusting the Y2O3 content, doping or looking at the degree of stabilisation of raw materials is a major expertise of which our customers benefit.

Mecanical properties and ion conductivity

- Fine tunin on Y2O3 contents
- In combination with the production technologies of the YSZ powders we experience an additional influence
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- More technical exchange is recommended to adress the specific needs



INTRODUCTION AND APPLICATIONS

Sensors and energy converters are present in many markets and industries. We supply our raw materials for the use in:

- ion conductors in solid oxide cells or gas sensors in energy, automotive or industrial markets,
- piezo-electric or ceramic capacitors in electronics industry and
- batteries or other energy storage devices.

There are many other examples but most have in common that the main product properties cover various dielectric and ionic conductivity characteristics. These often go together with the investigation on processing characteristics like shrinkage, bulk density, tap or packing density, modulus of rupture, magnetic content or dispersibility.

SPECIFIC APPLICATION EXAMPLE

lonic conductivity is needed in applications such as **gas sensors and solid oxide fuel & electrolyser cells.** Partially or fully stabilised Zirconias, specifically Yttria stabilised Zirconias, offer a variety of options and are among the most popular materials. We supply into this field a set of different Y2O3 contents from 5 to 16wt% combinable with diverse particle sizes from approx. 5µm down to 0.3µm. Our Y Zirconia for ion conductors features a low surface area which are particularly adapted for injection-moulding and tape casting.

In our current and future development we address the need of further performance optimisation as well as cost reduction needs. We like to explore & utilise our technologies and materials together with our customers.



Waste water treatment plant at the chem. ZrO, plant

OUR TYPICAL PRODUCTS

ALODUR[®] represents our fused Alumina and the EVT grades are calcined alumina types. They are ideal for (hot) injection molding, extrusion or slip casting and feature an overall high product consistency including carefully controlled particle size distributions.



EVT 400



EVT 500



		YSZ
Applications	Sensors and ion & proton conductors	\odot
	Electro-ceramic components	
	Batteries and other energy storage	\odot
Products	Product category	5% Y Zirconia HP 7.5% Y Zirconia UHP 8% Y Zirconia HP 13% Y Zirconia HP 16% Y Zirconia HP
	Size category	-1μm -2μm 3-5μm other
Basic product information	Fused & crushed type	\odot
	Spherical type	
	Other type	
	Primary crystal size	
	Typical soda content	
	0.3 to 2µm	\odot
	2 to 5µm	\odot
	5 to 10µm	
	> 10µm	
	Other	

Others: Synthetic graphite, finished kiln furniture for powder calcination or component production.

			ALODUR®	TECO®	
MgSZ	ZrO ₂	Chemical ZrO ₂	Calcined Al ₂ O ₃	Fused Al ₂ O ₃	Fused SiO ₂
Ø	\odot	\odot	\odot	\odot	Ø
	\odot			\odot	\odot
	\odot		\odot		
2.45% MgO Zirconia SP Other	MgO Zirconia SP Z99 ZCO-SA	ZRO elec	EVT	ZWSK KKW KKW SP ESK ZESK WSK	TECO-SIL TECO-SPHERE
-2µm	-2μm -5μm -100+325#	1.5µm 3-5µm	304	F80 F70 F36 F150 and finer	<10µm 10-20µm
\odot					\odot
					\odot
	\odot	\odot	\odot		
			~2.8µm		
			~0.06%	diverse levels between 0.1 to 0.4%	
\odot	\odot	\odot			
		\odot	\odot		
			\odot		\odot
					\odot
	\odot			\odot	



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