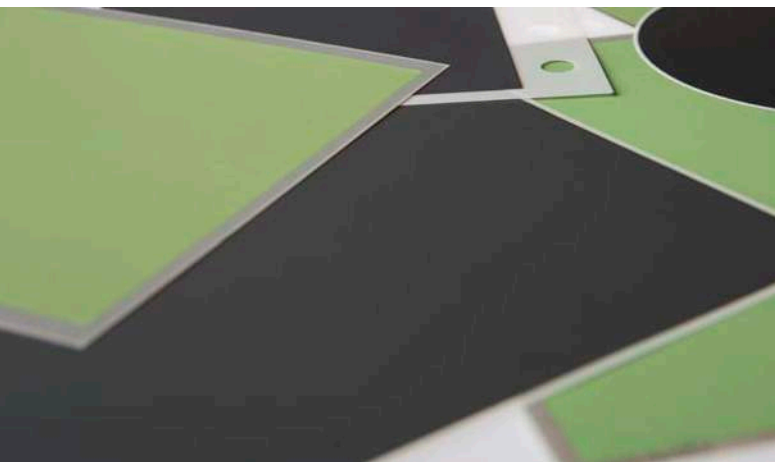
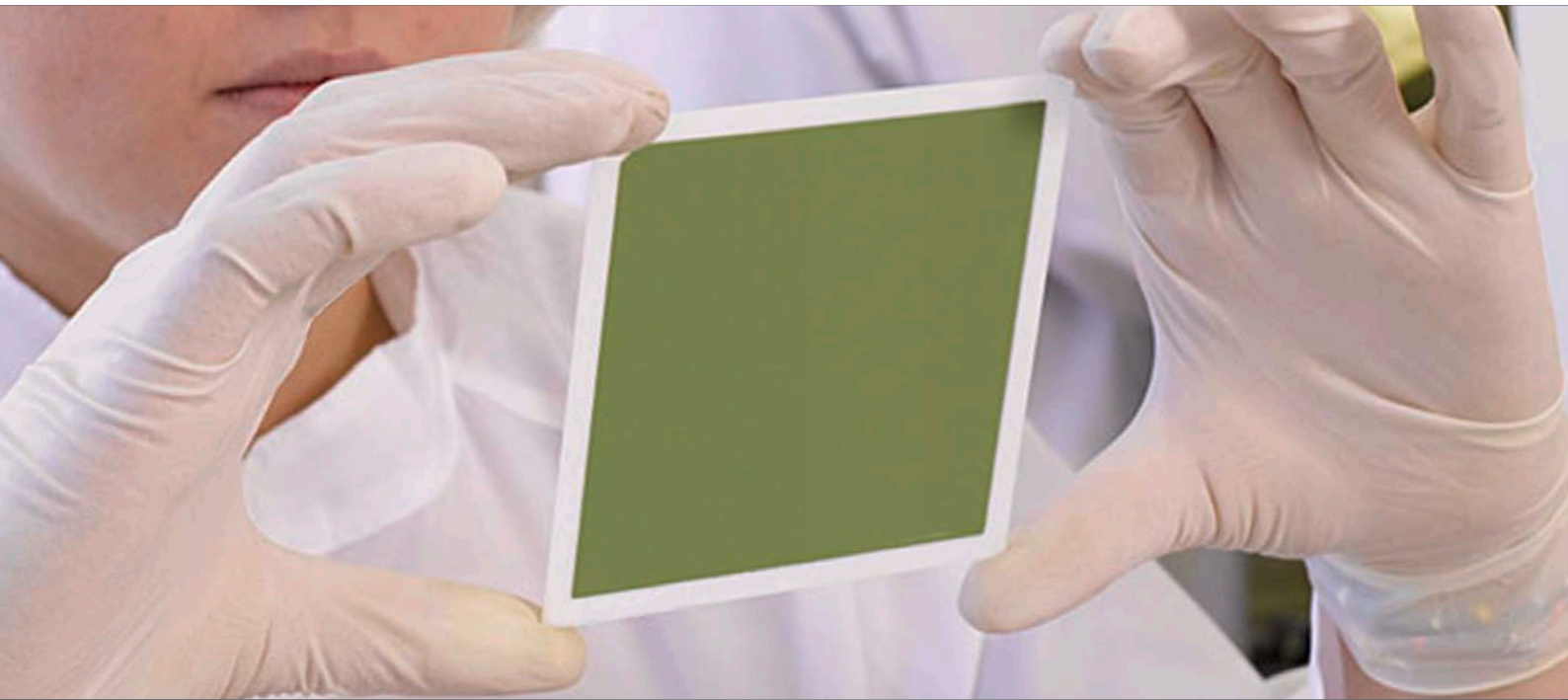


# SOLID OXIDE FUEL CELLS (SOFC) Customized Solutions

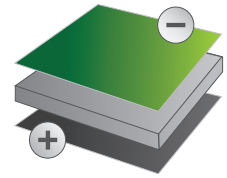
Innovation in Environmental Technology and Power Generation



## SOFC Products

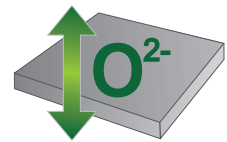
### Electrolyte Supported Cells

Kerafol offers SOFCs with different electrode materials on different electrolyte substrates. Customers can choose between electrolytes with a higher power density or a higher mechanical stability. The electrode materials can be chosen according to its application. KeraCell III electrodes provide not only a high performance for SOFC but also for SOE application.



### Electrolyte Substrates

Kerafol offers zirconia based electrolyte substrates with various dopant elements. Depending on the dopant concentration, the substrates feature a higher conductivity or a higher mechanical stability.



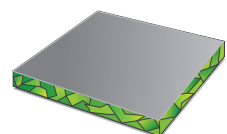
### Tape Development (R & D)

Kerafol has a long experience in the development and production of customized porous and dense ceramic tapes of different polymer / ceramic, ceramic and glass-ceramic materials for various applications. Kerafol offers the complete development and production of tapes based on customized powders.

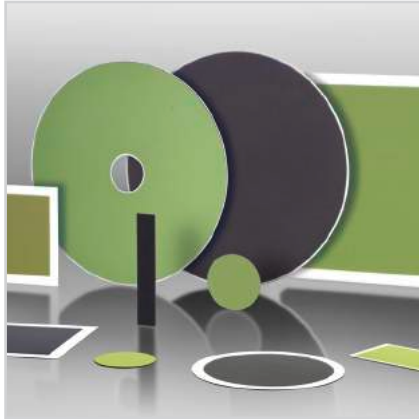


### Glass Sealing Tapes

Our glass sealing tape is best suited for a long term stable gastight assembling of CFY (chromium based alloy) or ferritic steel with electrolytes.



## Electrolyte Supported Cells



### Key features

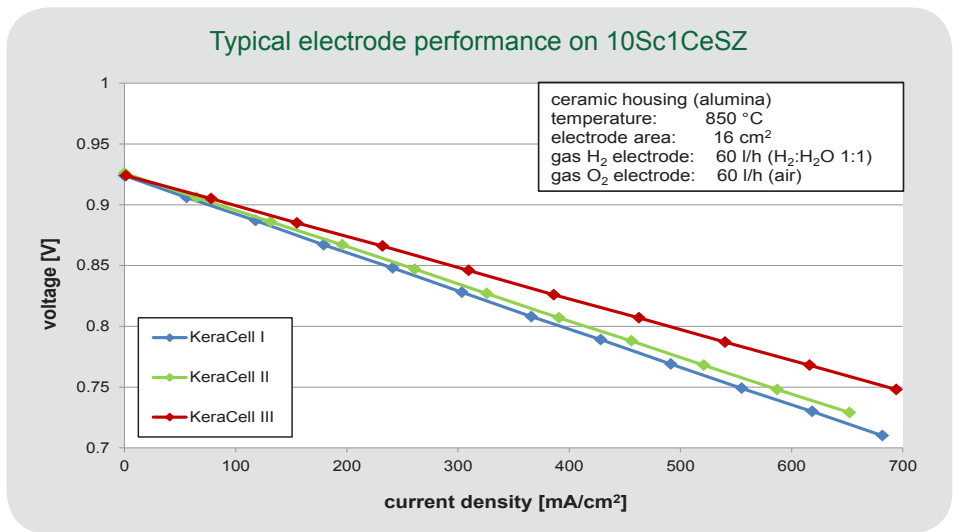
- electrolyte supported cells based on zirconia substrates
- high planarity and mechanical stability
- long term stability, redox stability, thermal cycling stability
- KeraCell III suited for electrolysis

### Cell performance – electrode materials

Characteristics	Unit	KeraCell I	KeraCell II	KeraCell III
10Sc1CeSZ thickness	[ $\mu\text{m}$ ]	160	162	163
Current density (0.7 V)	[ $\text{mA}/\text{cm}^2$ ]	710*	750*	880*
Area specific resistance	[ $\text{Wcm}^2$ ]	0.32	0.30	0.26

\* extrapolated value

### Typical electrode performance on 10Sc1CeSZ

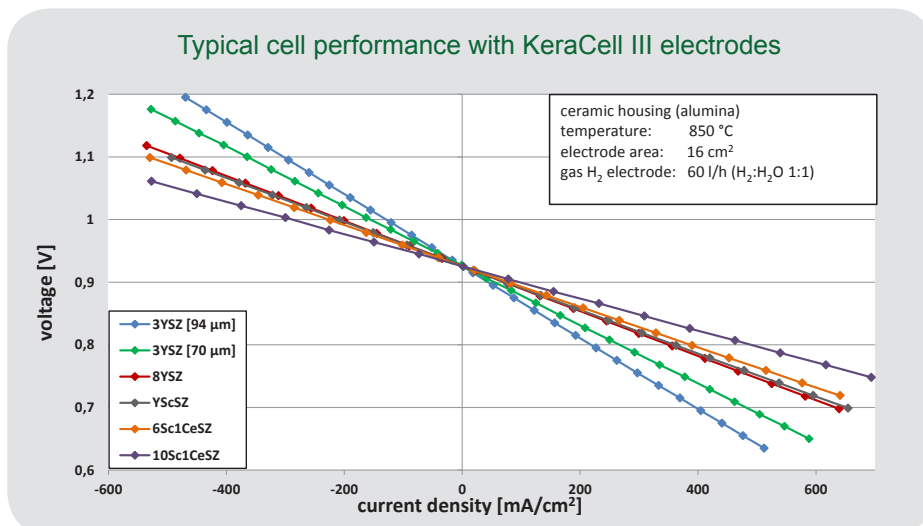


### Cell performance – electrolyte materials

Characteristics	Unit	3YSZ	3YSZ	8YSZ	YScSZ	6Sc1CeSZ	10Sc1CeSZ
Electrolyte thickness	[ $\mu\text{m}$ ]	70	94	160	150	128	163
Current density (0.7 V)	[ $\text{mA}/\text{cm}^2$ ]	480	390	630	650	710*	880*
Voltage (-500 mA/cm <sup>2</sup> )	[V]	1.16	1.21*	1.11	1.1	1.09	1.05
Area specific resistance	[ $\text{Wcm}^2$ ]	0.47	0.58	0.36	0.35	0.32	0.26

\* extrapolated value

### Typical cell performance with KeraCell III electrodes



## Electrolyte Substrates



### Key features

- thin electrolyte substrates based on zirconia
- partially or fully stabilized with yttria or/and scandia
- high planarity and gastight

Characteristics	Unit	3YSZ	8YSZ	6Sc1CeSZ	10Sc1CeSZ	YScSZ
Dopant, stabilization	[mol%]	Yttria, 3	Yttria, 8	Scandia, 6 Ceria, 1	Scandia, 10 Ceria, 1	Yttria/Scandia/ Ceria
Ionic conductivity (850 °C)	[S/cm]	0.022	0.08	0.085	0.17	0.078
Mechanical strenght (Kerafol double ring test, 8YSZ = 100%)	[%]	330	100	270	140	140
Sinter density	[g/cm <sup>3</sup> ]	> 6.00	> 5.95	>5.85	> 5.70	> 5.90
Standard thicknesses	[µm]	70 / 90	150	100	150	150

## Tape Development (R & D)



Based on our long experience in the development and production of ceramic tapes of different materials for various applications, we offer:

- customized solutions
- consulting & development
- production services from lab scale to mass production

## Glass Sealing Tapes



### Key features

- alkali free glass sealing tapes for CFY and ferritic interconnectors
- gastight
- long term stable
- formation of stable glass ceramics after partial crystallization
- joining of steel / steel or steel / ceramic

Characteristics	Unit	KeraGlas ST K03
TEC 660°C of crystallized glass	[ppm/K]	10.0 ± 0.5
TEC range joining partners	[ppm/K]	9.5 ...12
Designated SOFC operating system	[°C]	650...820
Joining temperatur*	[°C]	830...850
Durability SOFC steels		CFY / CroFer22APU / ZMG232L / ITM / CroFer22H
Durability SOFC electrolytes		YSZ / ScSZ
Known non-compatibilites		La1-xSrxMnO3, La1-xSrxMn1-yCoyO3 / MnCo2-xFexO4

\* complete firing schedule will be communicated after purchasing the product

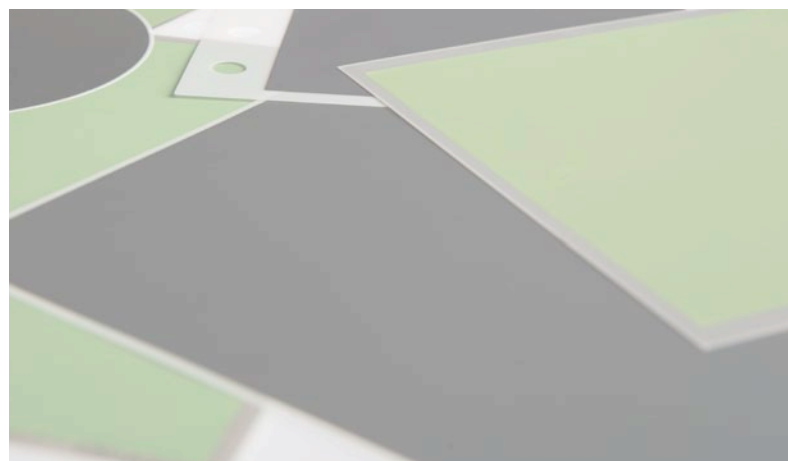


**For a highly efficient energy conversion.**

We are looking forward to receiving your inquiry!

Kerafol offers different components in the field of solid oxide fuel cells which convert chemical energy to electrical energy or vice versa.

Discover our range of products and take advantage of the diverse application possibilities!



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