



Zirconia-Based Electrolyte Materials

fuelcellmaterials.com offers nanoscale zirconia-based electrolytes which have advantages over traditional yttrium stabilized zirconia (YSZ). YSZ is the most popular electrolyte material for solid oxide fuel cells (SOFCs) because it conducts only oxygen ions over a wide range of oxygen partial pressures. YSZ membrane supported SOFCs are normally operated at temperatures above 800°C to achieve sufficiently high oxygen ion conductivity. Thin-film (10-20 μm) YSZ membranes and scandium-doped zirconia (ScSZ) both provide high oxygen conductivity at much lower operating temperatures. Nanoscale zirconia electrolyte materials are ideal for fabricating thin film electrolytes in electrode supported solid oxide fuel cells via colloidal deposition processes. YSZ and ScSZ are offered in the form of 100 mesh, high surface area powders. *fuelcellmaterials.com* also offers YSZ powders suitable for tape casting. Custom doped zirconia compositions can be produced to your specifications.

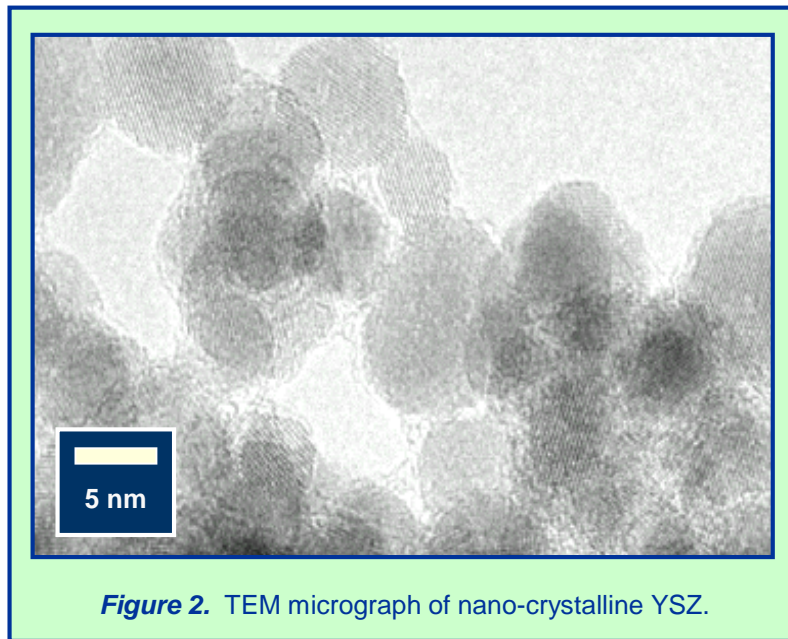
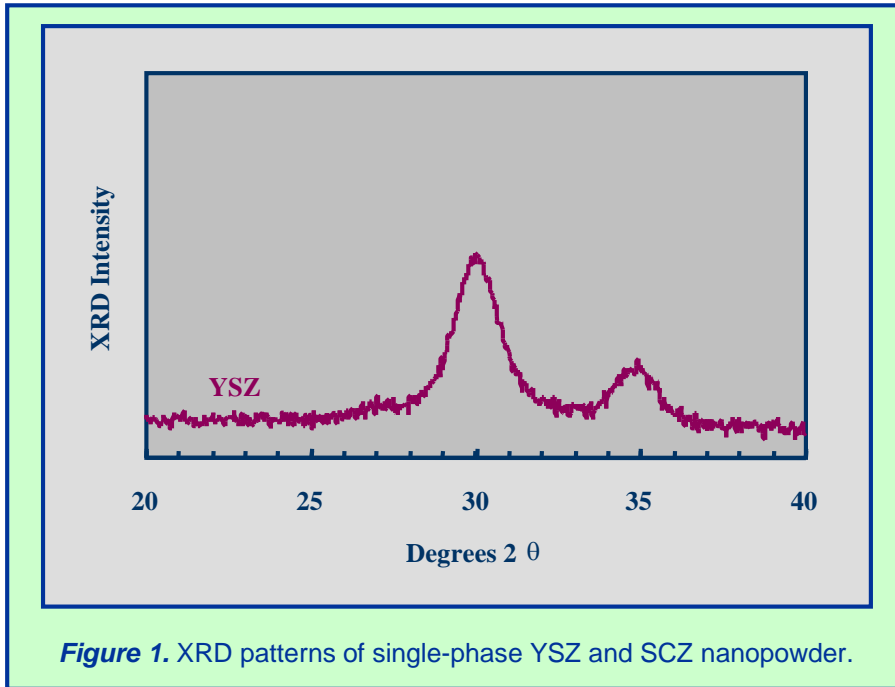
Applications

- Electrolyte material for solid oxide fuel cells, oxygen generation systems and sensors
- Nanoscale is an additive to reduce sintering temperature of tape cast grade powders
- Colloidal deposition processes for thin-film membranes
- Component in composite electrodes (anodes and cathodes)

Benefits

- High crystalline-phase and chemical purity
- Surface area can be tailored to specific processing requirements
- Enhanced densification at lower sintering temperatures

Table 1. Product Specifications	
Compositions (*)	YSZ: $(ZrO_2)_{0.92}(Y_2O_3)_{0.08}$ ScSZ: $(ZrO_2)_{0.90}(Sc_2O_3)_{0.10}$
Crystal Structure	Single-Phase Fluorite
Surface Areas	Nano-powders 120-200 m ² /g YSZ: 4-8 m ² /g; PSZ: 13-19 m ² /gram
Crystallite Size (nano-YSZ)	5-10 nm
Ionic Conductivity (YSZ)	$\sigma > .02$ S/cm @ 800°C
Thermal Expansion (YSZ)	$\alpha = 10.5$ ppm/°C
(*) Custom formulations available	



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