

ENrG[®] Inc.

Thin E-Strate[®]

Ultra-Thin, Flexible Zirconia Ceramic

Zirconia Ribbon Ceramic
World's 1st Continuous Roll-to-Roll Ceramic

Solid State & Thin Film Devices, Flexible Hybrid Electronics or Sensors:

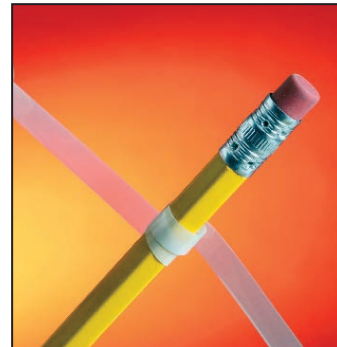
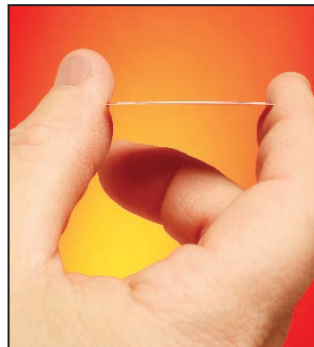
- Ultra barrier
- Durable
- Lightweight
- Translucent
- Wear resistant
- Corrosion resistant
- Biocompatible

Processing Advantages:

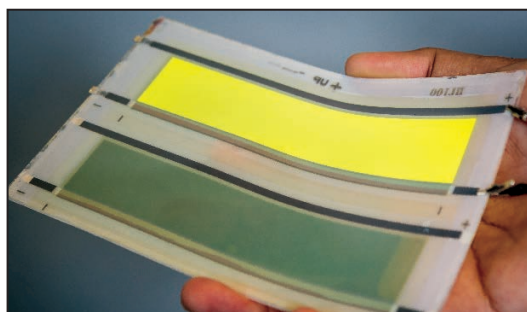
- High temperature capable
- No outgassing
- High purity ceramic
- Thermal shock tolerant
- Dimensionally stable
- Patterned by std. techniques



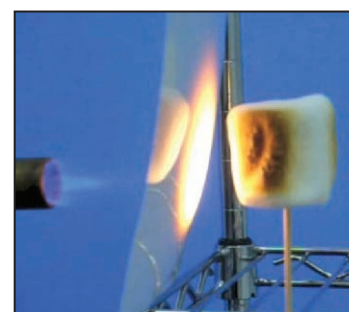
Thin E-Strate[®] as support and seal in Flexible Solid State
Lithium Batteries and OLEDs.



20 μ m thick ceramic



OLED Photo Courtesy of Holst Centre



Low thermal mass:
Charred marshmallow demo



Thin E-Strate[®] Substrate Evaluation Kits Available for Purchase Online

In various substrate sizes in 20 μ m, 40 μ m thickness

For shipments outside the U.S.,
please contact ENrG Inc. for a quote.

Contact Us Regarding Your Custom Requirements

Papers:

Thermal and Electrical Characterizations of Ultra-Thin Flexible 3YSZ Ceramic for Electronic Packaging Applications, Xin Zhao et al.
International Symposium on Microelectronics: Fall 2016, Vol. 2016, No. 1, pp. 000391-000396 <https://doi.org/10.4071/isom-2016-THA13>

Visible Flip-Chip Light-Emitting Diodes on Flexible Ceramic Substrate With Improved Thermal Management, Seung Hwan Kim et al.
IEEE Electron Device Letters, Volume: 37, Issue: 5, May 2016 10.1109/LED.2016.2547877

Ultrathin Yttria-Stabilized Zirconia as a Flexible and Stable Substrate for Infrared Nano-Optics, Kavitha K. Gopalan et al.
Advanced Optical Materials, December 2018 <https://doi.org/10.1002/adom.201800966>

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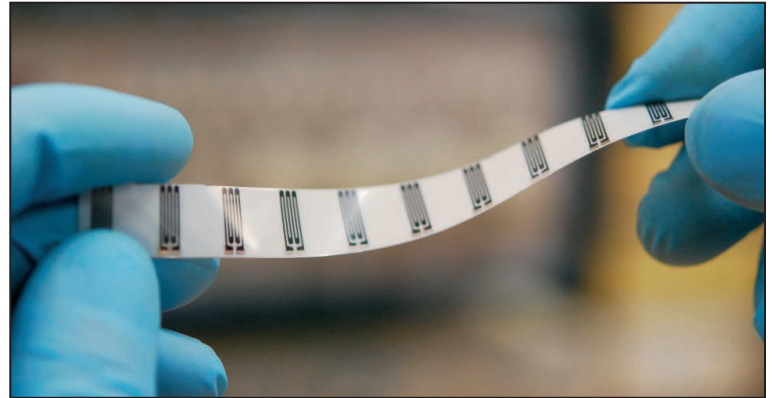


Applications:

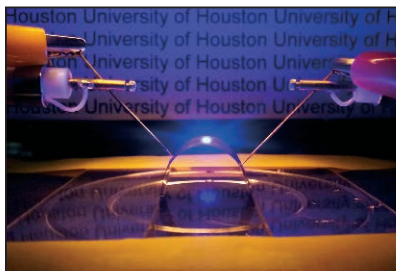
Thin film devices, portable electronics, solid state batteries, lightweight thin solar PV, durable labels, display backplanes, harsh environment sensors, heaters and bio-compatible devices.

Thick film printed QR code on Thin E-Strate[®] link to ENrG website

Property	Measurement
Physical:	
Material	3mol% Yttria-Stabilized Zirconia (3YSZ)
Surface Roughness	20-25 nm
Density	6.04 g/cm ³ , 99% dense
WVTR	1.5 ± 0.9x10 ⁻⁶ g/m ² /day (45°C/85%RH)
Mechanical:	
Bend Strength	1.2 GPa, measured on 2 cm strip, 20 microns
Tensile Strength	248 MPa @RT
Thermal:	
Processing Temperature	≤ 1200°C up to 2 hrs.
Operating Temperature	Up to 1000°C
Bulk Thermal Conductivity	2.7 W/mK
Electrical:	
Dielectric Constant	28 @ 2.6 GHz
Dielectric Strength	3200 VDC @ 40µm, 2500 VDC @ 20µm (R.T.)
Optical:	
Refractive Index	2.2
Translucency	15% dispersive @ 40 microns
IR Transparency	80% between 2-7 nm



Thin film strain gages on zirconia ribbon

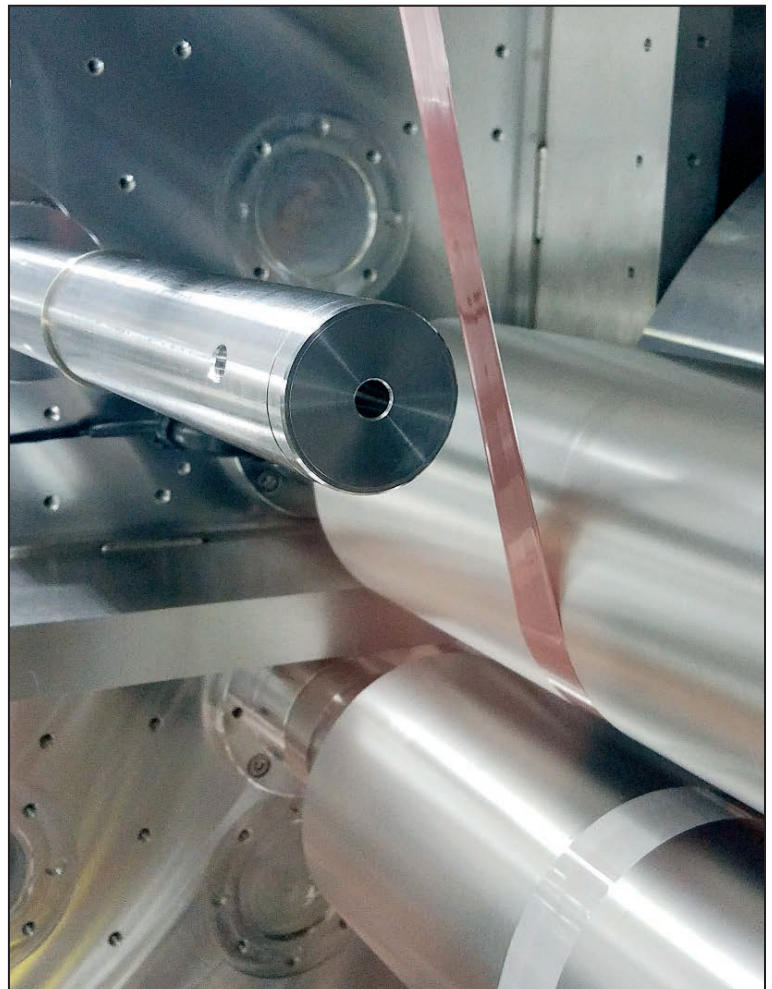


GaN flip-chipped LED operating more efficiently and cooler on a flexed Thin E-Strate[®] substrate

Photo courtesy University of Houston



Printed silver folded-dipole antenna



R2R sputtered thin film copper on zirconia ribbon (Courtesy of Intellivation)



Laser cut features in Thin E-Strate[®]

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