



NEWS RELEASE

December 6, 2021

Tokyo, Japan—Tosoh Corporation is pleased to announce its newest addition to its line-up of zirconia powders, the Zgaia series. The company's redesign of the particle structure of conventional zirconia makes possible lower-temperature sintering, at 1,250°C, than the usual 1,500°C, thus, reducing carbon dioxide emissions in the manufacturing process.

Tosoh's Zgaia 1.5Y-HT is a world first. It features the lowest level of yttrium oxide (Y₂O₃) content, of only 1.5 mol%, ever achieved in zirconia, while exhibiting both superior bending strength and fracture toughness. Furthermore, Tosoh will also start introducing to customers the Zgaia series' 3Y-LD grade, which features high durability owed to past efforts of Tosoh R&D.

The mechanism behind Zgaia 1.5Y-HT's fracture toughness, meanwhile, is being investigated by the Next Generation Zirconia Social Cooperation Program, which involves the University of Tokyo and Tosoh Corporation and other private companies. The participants in this research program plan to issue a joint announcement soon to inform customers of that mechanism. The company is also considering starting the mass production of its Zgaia series in tandem with the announcements regarding the mechanism of Zgaia 1.5Y-HT's fracture toughness.

Tosoh was the world's first company to mass produce zirconia, and it maintains its position as the world's leading manufacturer in the field of fine ceramics. The company continues to focus on developing innovative technologies.

1. Features of the Zgaia series overall

- A) A redesigned particle structure makes possible low-temperature sintering.
- B) A proprietary manufacturing method ensures uniform Y₂O₃ distribution.
 - A Y₂O₃ content of 1.5 mol% is sufficient for sintering Zgaia 1.5Y-HT.
 - A uniform microstructure of sintered particles suppresses hydrothermal degradation in Zgaia 3Y-LD.

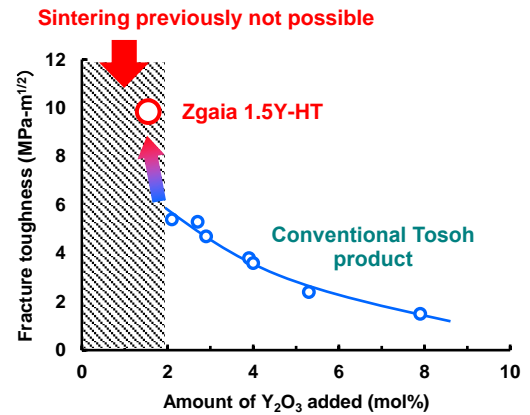
2. Features of the Zgaia series by grade

A) Zgaia 1.5Y-HT

A Y₂O₃ content lower than previously capable of being sintered enables the fracture toughness and bending strength not possible with conventional zirconia.

	Zgaia 1.5Y-HT		TZ-3YSB-E (Conventional Tosoh product)
Amount of Y ₂ O ₃ added (mol%)	1.5		3
Sintering temperature (°C)	1,250	1,350	1,500
3P bending strength (MPa)	1,200	1,200	1,500
Fracture toughness (MPa·m ^{1/2})*	8.5	10.1	4.7
Monoclinic ratio after autoclave test 140°C × 24 hours	33	67	73

Relationship between Y₂O₃ content and fracture toughness in Tosoh zirconia powders



B) Zgaia 3Y-LD

A four-year period of accelerated degradation tests where the sintered material was immersed in 140°C water resulted in almost no deterioration and confirmed Zgaia 3Y-LD's remarkable durability.

	Zgaia 3Y-LD
Amount of Y ₂ O ₃ added (mol%)	3
Amount of Al ₂ O ₃ added (wt%)	0.25
Sintering temperature (°C)	1,250
3P bending strength (MPa)	1,000
Fracture toughness (MPa·m ^{1/2})*	3.9
Monoclinic ratio after autoclave test 140°C × 100 hours	0.2
140°C × 1,500 days	2.5



After 1,500 days at 140°C
(Monoclinic ratio: 2.5%)

*This value is the result of an evaluation by Tosoh and is not guaranteed. Fracture toughness was measured by the JIS R1607 single-edged pre-cracked beam (SEPB) method

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TOSOH CORPORATION

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Who We Are

Tosoh Corporation is the parent of the Tosoh Group, which comprises over 100 companies worldwide and a multiethnic workforce of over 12,000 people, and generated net sales of ¥732.9 billion (US\$6.9 billion at the average rate of ¥106.1 to the US dollar) in fiscal 2021, ended March 31, 2021.

What We Do

Tosoh is one of the largest chlor-alkali manufacturers in Asia. The company supplies the plastic resins and an array of the basic chemicals that support modern life. Tosoh's petrochemical operations supply ethylene, polyethylene, and functional polymers, while its advanced materials business serves the global semiconductor, display, and solar industries. Tosoh has also pioneered sophisticated bioscience systems that are used for the monitoring of life-threatening diseases. In addition, Tosoh demonstrates its commitment to a sustainable future in part by manufacturing a variety of eco-products.

Stock Exchange Ticker Symbol: 4042

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