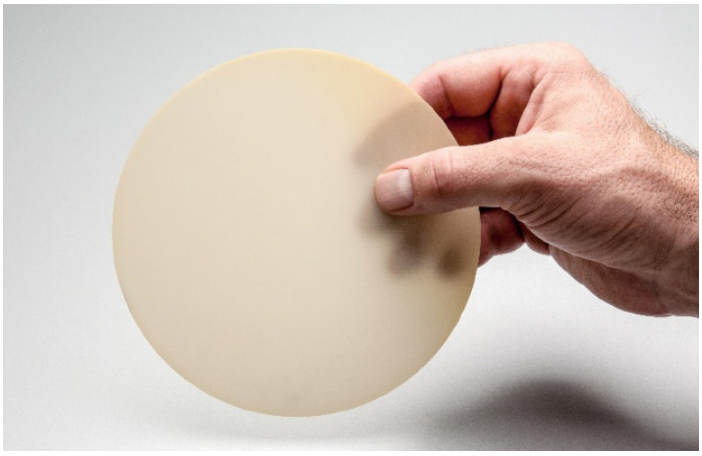
200 mm (8 inch) Diameter PZT Wafer

Polycrystalline Piezoelectric Wafer

CTS has recently developed an industry-leading 8 inch (200 mm) diameter polycrystalline piezoelectric wafer. This larger diameter wafer's leading application is in high-volume manufacturing processes for industrial applications (e.g. sensors for haptics and biometrics applications) and other similar applications using silicon wafer processes and equipment. Fingerprint ID detection is experiencing rapid growth in the smartphone market.



200 mm PIEZOLECTRIC WAFER COMPATIBILITY

Currently, the primary technology used in fingerprint ID detection is based on capacitive technology. While this primary technology satisfies current needs in the smartphone market, the security level has been criticized. As a result, ultrasonic fingerprint identification technology has been developed to provide increased levels of security. Additionally, silicon wafer processes have advanced from 150 mm (6 inch) to 200 mm (8 inch) in most wafer processes. Much of the high-volume equipment used in these devices' production is based on 200 mm wafer geometries. As a result, providing piezoelectric wafers in this size is critical to manufacturability. Unlike 150 mm wafers, 200 mm wafers are compatible with standard equipment utilized in high-volume industrial semiconductor processes.

CTS' HIGH DENSITY 200 mm SOFT PZT WAFER

Soft Lead Zirconia Titanate (PZT) polycrystalline ceramic material is a common choice in medical, consumer electronics, and industrial high-volume applications. Soft PZT ceramics are ceramic materials that have large values for permittivity, dielectric dissipation, and lower Curie points, which are very common in sensing and actuator applications. CTS has achieved a high density 200 mm soft PZT wafer with uniform piezoelectric properties. Each wafer maintains consistent properties to support the high-volume needs in the marketplace.

OVERCOMING CHALLENGES TO DELIVER CONSISTENT PROPERTIES

A challenge with larger wafers is thickness. Many applications require higher frequency response and thus a thickness in the 100 µm range or less. The larger the wafer, the more difficult it becomes to create a free-standing wafer that is not bonded to and supported by a backing material. Therefore, in addition to developing the larger diameter, CTS has also developed unique methods for reducing the 200 mm wafer to the 100 µm thickness range for monolithic solid PZT wafers and 60 µm for 1-3 composite structures where the PZT pillars are isolated by epoxy fill.

200mm (8 inch) Diameter

Manufacturing piezoelectric bulk wafers is ensuring consistent quality from wafer to wafer. As the wafers' size increases, it becomes more challenging to keep the product quality consistent in flatness and control the electrical property variance. The thinner the wafer, the more difficult it becomes to prevent warpage. Perfecting grinding and lapping processes are critical to developing flat wafers. Larger wafers are also more likely to have more significant variation across the area of the wafer.

Input variables that can affect these properties, such as powder processing, block sintering, and machining processes, must be optimized. Optimizing the material to high-density (d_{meas} > 99.5% dt_{theo}) polycrystalline piezoelectric material compared to standard-density offers better dicing and grinding performance, critical for composite applications. The raw materials used in the processing of polycrystalline piezoelectric wafers material and the process parameters provide an enhanced microstructure, resulting in superior micro-machining with fewer grain pull-outs.

SHIPPING OPTIMIZED FOR PROCESS COMPATIBILITY

There are several methods available for packaging large frame products. A preferred method to prevent damage during the shipping of fragile wafers is the tape and frame method which is compatible with high volume semiconductor processes. During the tape and frame wafer mounting process, the UV-sensitive adhesive plastic tape secures the piezoelectric wafers' positioning, especially for the grinding and dicing processes. Once the parts are ready to be released, the tape is exposed to UV light to reduce the tape's adhesion to the parts. The parts can then be removed and are ready to process at the customer facility.

APPLICATIONS

CTS' high-quality 200 mm soft PZT wafer can be used in a wide variety of markets and applications that require low-cost, high-volume manufacturing.

Applications include:

- Consumer electronics (e.g., haptics, biometrics (fingerprint ID sensors)
- Inkjet printing
- Hard disc drives
- Medical ultrasound

ABOUT CTS

CTS Corporation is a leading developer and manufacturer of high-performance piezoelectric materials for a wide range of applications, including medical, defense, inkjet, industrial, oil and gas and automotive markets. Available in a variety of material compositions, these piezoelectric materials can be produced in various geometries in a comprehensive range of dimensions and in high volumes to support end-product specifications.

CTS offers a market leading level of possibilities for product customization of bulk products according to specific customer requirements. With foundries in Europe and North America and additional finishing facilities in Asia and Mexico, CTS' global footprint is uniquely positioned to produce large volume programs and provide quality and reliable products to customers worldwide.

CONTACT INFORMATION

Technical Inquiries
(www.ctscorp.com/contact/request-technical-info/)

Sales Inquiries
(www.ctscorp.com/contact/sample-request/)

CTS Corporation
4925 Indiana Avenue
Lisle, IL 60532
Web: www.ctscorp.com
E-mail: www.sales@ctscorp.com
Media: mediarelations@ctscorp.com