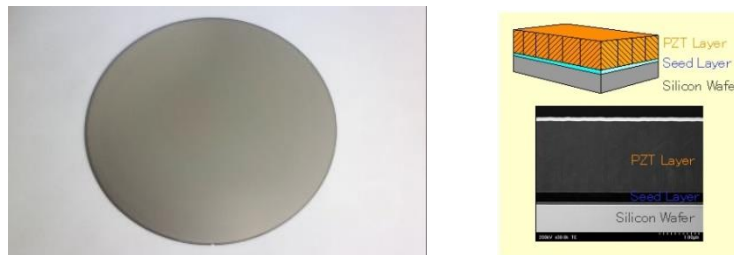


July 28, 2021

Sumitomo Precision Products Co., Ltd.

Announcement of sales release on a newly developed highest performance^{*1} Epitaxial PZT film

Sumitomo Precision Products Co., Ltd. (SPP) has developed two new types of highest performance Epitaxial lead zirconate titanate (PZT) film that can be applicable for piezoelectric MEMS devices such as MEMS mirrors, micro pumps, inkjet print heads, actuators, microphones, speakers, ultrasonic sensors, and infrared sensors. These films are compatible with 6-inch and 8-inch large diameter wafer processes. A customer sample will be provided from October 2021 and will be on sale from April 2021.



Epitaxial PZT film (8-inch wafer)

MEMS (Micro Electro Mechanical Systems) is a device that realizes very compact sensors and actuators by forming micron-level mechanical structures and electrical and electronic circuits on a silicon substrate using microfabrication technology. In order to function as a sensor / actuator, the technology for converting electricity and force in MEMS is an important element. By means of using a piezoelectric thin film is called piezoelectric MEMS.

In MEMS actuators such as MEMS mirrors and inkjet heads, which exert mechanical functions by electrical signals given to MEMS, piezoelectric thin films are required to have high actuation ability (ability to convert electricity into force). On the other hand, in a MEMS sensor such as a MEMS microphone that functions by converting the force received by MEMS into an electric signal, the piezoelectric thin film is required to have high sensing ability (ability to convert force into electricity). Gyro sensors and ultrasonic sensors require both actuation ability and sensing ability. The ability of these two piezoelectric thin films can be evaluated by the characteristics of the piezoelectric constant and the dielectric permittivity of the film. It is said that the higher the piezoelectric constant and the lower the dielectric permittivity, the better the ability of piezoelectric thin film is.

The PZT thin film, which has relatively high piezoelectric constant among piezoelectric materials, has been used in many MEMS devices. However, the conventional PZT thin film has a high dielectric permittivity, and there is a problem that high sensing ability cannot be obtained.

The epitaxial PZT thin film (Novel A: sensor performance-oriented type, Novel B: sensor performance / actuator performance balance type) developed by SPP has 1.5 to 2 times the sensing ability compared to the conventional one while suppressing the decrease in actuation capacity. The index (Figure Of Merit (FOM)) that indicates the

performance of the piezoelectric thin film that combines the functions of both the actuator and the sensor has achieved the highest performance in the world.

With this product, it is expected that the mechanical structure and signal processing circuit of MEMS with sensor functions will be simplified and downsized, and that MEMS with high sensitivity and new functions will be introduced. We believe that we can contribute to the realization of a comfortable and convenient life and a safe and secure society through MEMS applications such as medical and high-security authentication systems.

Toward the promising future, SPP will continue to contribute to solving social issues such as promoting a post-5G digital society and realizing a carbon-free society by providing products and services that utilize the strengths of our technology.

*1 Based on our research as of July 2021

<Contacts on this product>

Sumitomo Precision Products Co., Ltd., ICT Equipment and Devices Department, Marketing Group, Taku Aoki
TEL: +81-6-6489-8273 FAX: +81-6-6489-8263

<Reference >

Product Specifications	Piezoelectric constant d_{31} ^{※2}	Dielectric permittivity ϵ_r ^{※3}	FOM [GPa] ^{※4}	Sensor performance (Ratio to conventional)	Actuator performance (Ratio to conventional)
Novel A (sensor performance-oriented type)	149	264	53	2	0.6
Novel B (sensor performance / actuator performance balance type)	196	516	48	1.5	0.8
Conventional polycrystalline PZT thin film	240	900	40	1	1

※2 Piezoelectric coefficient d_{31} [pm/V] : Ability to deform under voltage

※3 Dielectric permittivity ϵ_r : Ratio to dielectric permittivity of vacuum

※4 FOM [GPa] : Figure Of Merit, Performance index, proportional to square of d_{31} and inverse proportion to ϵ_r

Please refer the SPP's ICT Equipment and Devices Web page for further details.

<https://www.spp.co.jp/mems/ict/en/index2.html>