



## HIGH-PERFORMANCE CERAMICS

# CERAMIC COMPONENTS FOR MICRO-POSITIONING

### Application:

Customized Ceramic Solutions for precision motion in micro-positioning

### Material:

Alumina  
Sapphire

Today's rapidly changing world keeps fuelling ongoing optimization of very precise positioning solutions and demanding industrial manufacturing processes for more powerful, miniaturized and more efficient high-tech products.

When high levels of accuracy are required, electromechanical solid-state actuators made of piezoceramics are typically used as the active element in quasi-static or resonant drives. Kyocera's advanced finceramics solutions already help to push the limits of today's nano positioning devices regarding resolution, repeatability, and reliability.

The components made of technical ceramics that are needed for areas subject to high mechanical stress must be dimensionally accurate and wear resistant. In addition, the surface finish and temperature-dependent expansion behaviour are crucial for low-vibration operation of the assemblies and a long-term stable connection with the mechanically sensitive piezoceramics. Functional properties such as high electrical resistance or the most efficient heat dissipation possible must also be considered.

Kyocera's portfolio includes more than 200 different, fully characterised ceramic materials, ranging from polycrystalline oxidic and non-oxidic variants to single-crystal materials. This ensures that the optimum combination of properties can be provided for the respective application in the field of nano positioning solutions.

Advanced technical ceramic materials are commonly used as components in piezo stepper motors such as rails, rings, and tips. The ceramic product must possess high wear resistance and dimensional accuracy to ensure optimal and precise performance in micro-positioning devices. Achieving excellence



in micro-positioning requires a ceramic material with a perfect balance of hardness, impact strength, surface roughness, and appropriate grain size.

Kyocera produces its own ceramic granulate, allowing for complete development and complete control over finished ceramic material properties.

Through various production methods, we can manufacture sample quantities as well as large series of several thousand pieces.

For micro-positioning applications, we offer fine microcrystalline alumina, zirconia-toughened alumina ceramics, or sapphire, all with very low porosity. This is ideal for ultra-high vacuum applications and cryogenic temperatures. Collaborating with customers in the micro-positioning industry, we determine the most suitable surface roughness and part design to optimise performance and ensure reliable production method.

- ▶ High accuracy and wear resistance
- ▶ Defined surface properties
- ▶ No void ceramics
- ▶ Nonmagnetic
- ▶ Electrically insulating
- ▶ Tuneable thermal conductivity
- ▶ UHV-compatible