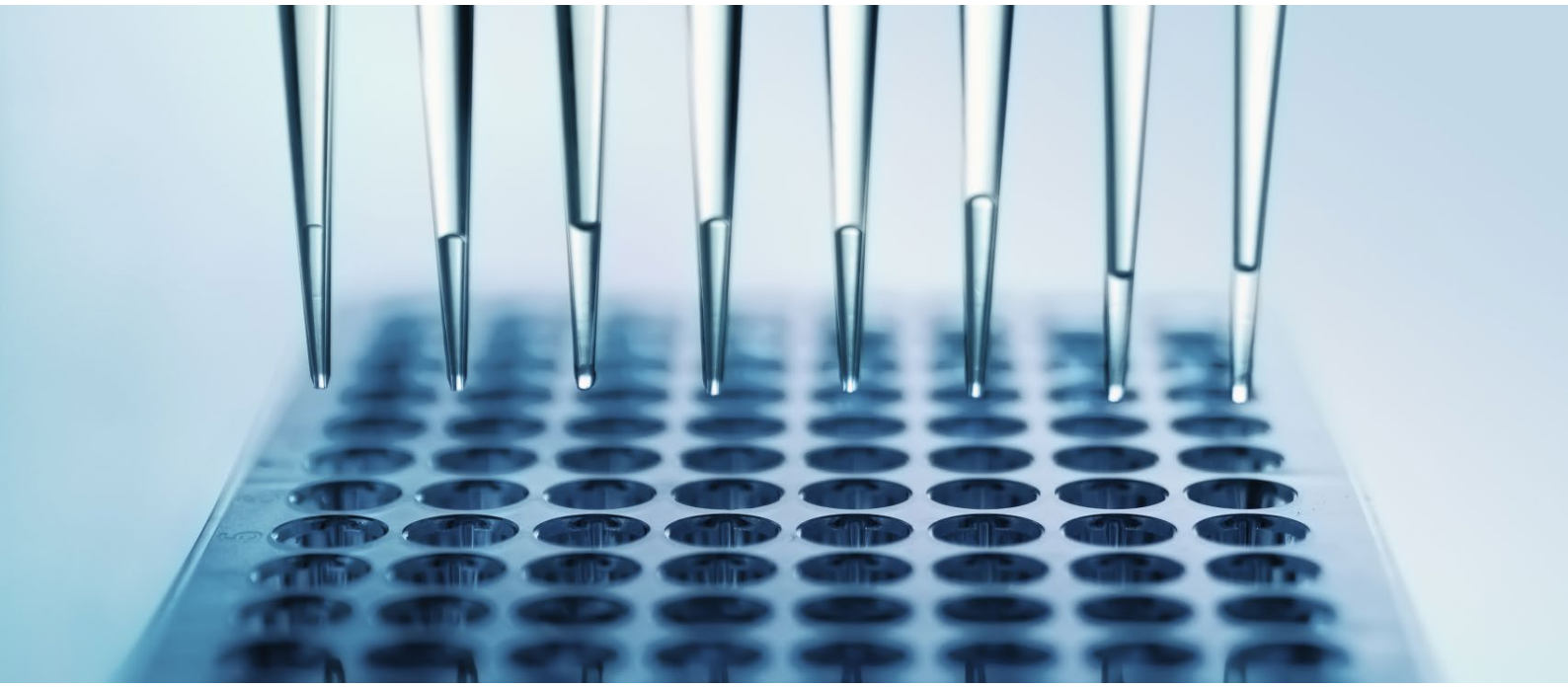
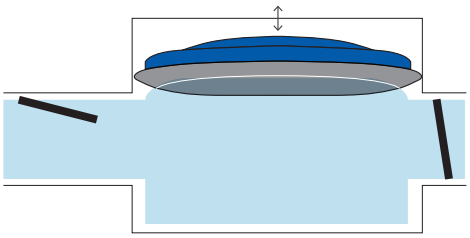


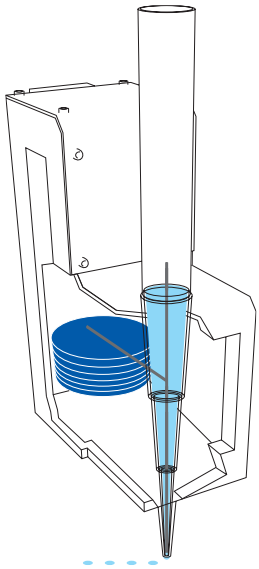
Piezo Components for Liquid Handling

MICROFLUIDICS FOR IN VITRO DIAGNOSTICS

Your Challenge

Liquid Handling in a Small Space





Shock-Free Pumping of Small Liquid Volumina

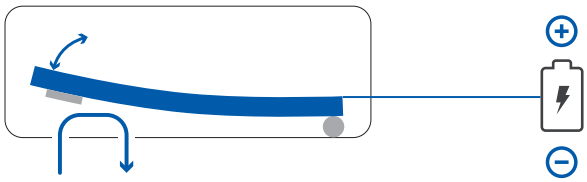
Piezo components glued to substrates or membranes are suited for such applications: their bending displacement is transferred to fluid chambers, ensuring a smooth flow of the liquid. Miniaturized piezo components drive light-weight micro pumps with dimensions of less than one millimeter, which can be integrated into portable point-of-care devices.

Precise Droplet Generation

To dispense tiny droplets down to a picoliter volume, the ink-jet principle can be implemented using piezoceramic tubes. PICMA® Stack piezo actuators also offer highly dynamic motion - by placing them in a printing head, micro assays are produced generating several thousands of droplets per second with high accuracy.

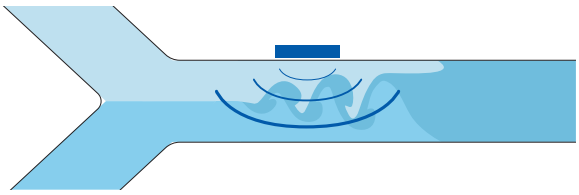
Piezoelectric microfluidic devices are used for distribution tasks whenever small volumes in the millilitre to picoliter range have to be controlled. They enable liquid handling applications in the field of in vitro diagnostics and lab automation such as

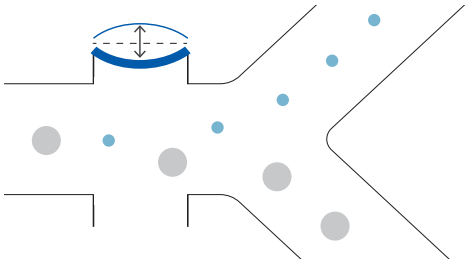
- Omics, e.g. genome sequencing or PCR
- Molecular diagnostics, e.g. ELISA testing
- Cytometry and single cell isolation
- Point-of-care and lab-on-a-chip systems
- Microarray spotting



Valve Functions With Very Low Flow Rates

Piezo actuators switch valves directly or work against a closing spring or a flexible tube for volume displacement. Piezoelectric valves can be designed with PICMA® Multilayer Bending Actuators exhibiting displacement of up to a few millimeters depending on their design. Due to their extremely low energy consumption, piezo actuators are ideal for battery-operated point-of-care devices.





Active Mixing Tasks

Glued on top of a pipe or capillary, piezo components such as discs or plates generate ultrasonic waves, causing local density fluctuations and micro turbulences. Active mixing can also be implemented by the use of cavitation due to power ultrasound or moving piezo actuators.

Challenging Separating and Sorting Tasks

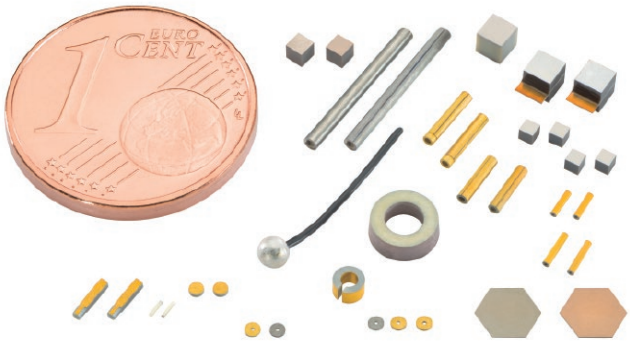
To ensure precise and fast motion, piezoelectric discs or PICMA® multilayer piezo actuators are needed. They enable instantaneous displacement of a few micrometers with a high frequency to manipulate the flow within microfluidic channels.

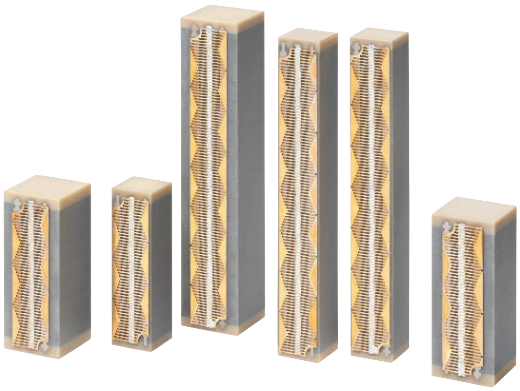
Our Solution

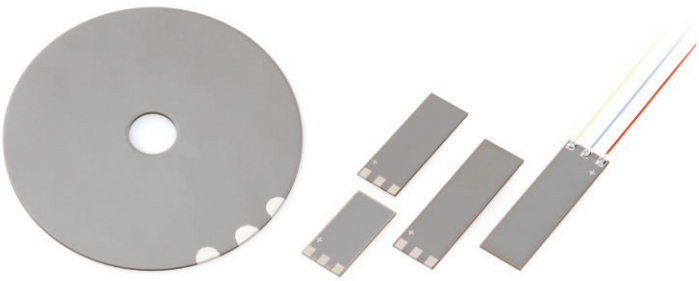
Piezos for Lab Automation and Point-of-Care Devices

PIEZOCERAMIC COMPONENTS

- Various geometries (plates, discs, tubes) as well as freeforms
- Electrodes with thick film silver or thin film Au, CuNi etc.
- Fully customized geometry, dimensions and electrode design possible
- Miniaturisation down to dimensions of less than one millimeter
- Plug-and-play with contacted components using wires, braids or flexible PCBs
- Assembling of components by means of bonding with substrates or membranes
- Connection technology including matching layers, seismic masses and housings, insulation, potting and encapsulation







PICMA® STACK & PICMA® BENDER PIEZO ACTUATORS

- Low operating voltage
- Microsecond response
- High force suitable for highly viscous fluids
- Extreme durability
- Subnanometer resolution
- Benders show high displacement of up to 2 millimeters
- Customized designs including end pieces, electrical connection and assembling

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