



Southern federal University
Institute of high technologies and piezotechnics
SCTB "Piezopribor"

PEZOELECTRIC Multilayer actuators



Handbook

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Introduction

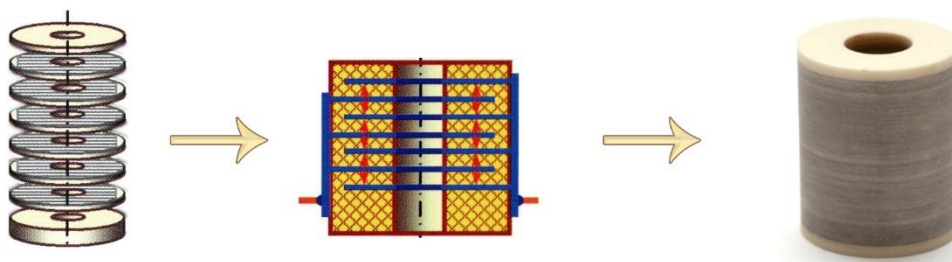
A piezoactuator is an electromechanical device designed to actuate mechanisms, systems, or control them based on the piezoelectric effect.

Film technology



Film thin, μm	50-200	
Maximum layer number	100	
Geometry	Disc	Rectangular plate
	$\text{Ø } 5 - 15 \text{ mm}$	From 5 x 5 mm to 15 x 15 mm

Solid state technology



Film thin, μm	200-500	
Maximum layer number	100	
Geometry	Disc	Rectangular plate
	$\text{Ø } 5 - 25, \text{Ø } 2 - 20 \text{ mm}$	От 5 x 5 мм до 25 x 25 мм

The movement (stroke) Δl of the actuator is determined by the formula:

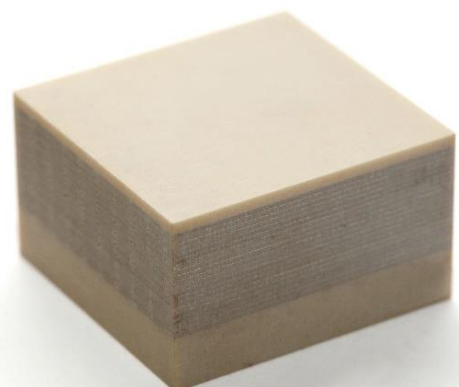
$$\Delta l = E \cdot d_{33} \cdot l_0 \cdot N, \text{ where:}$$

E – electric field strength
(V/m или N/C)

d_{33} – piezo constant (pC/N)

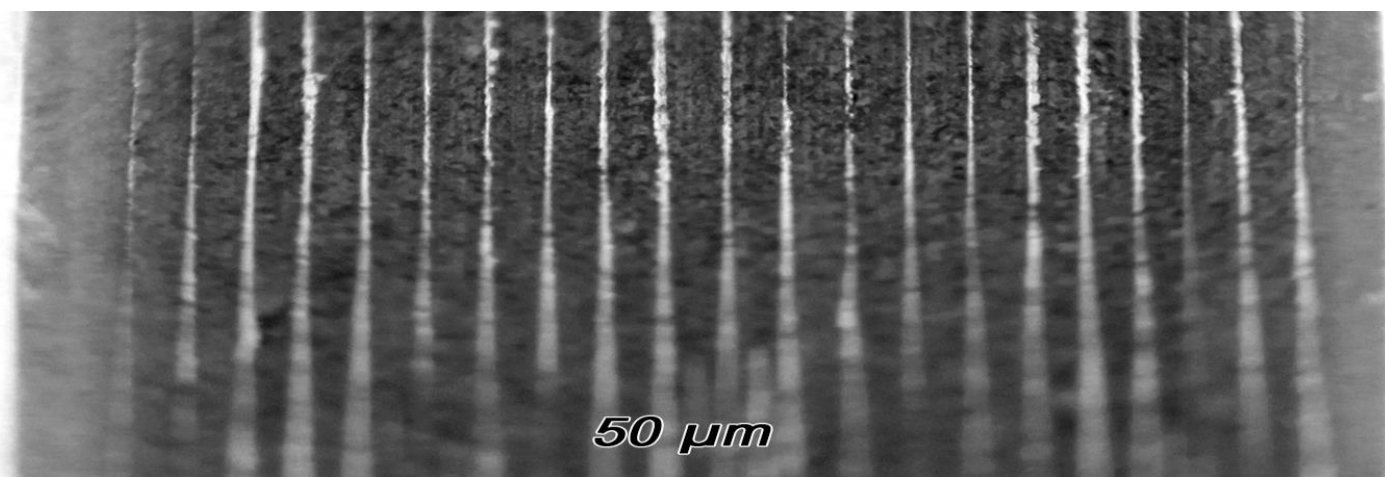
l_0 – thin of one layer(m)

N – number of layers



The most applicable materials for the manufacture of piezoactuators are PZT-19, PKP-11, PKP-12, PKP-14 of Piezopribor production.

Material	$\epsilon_{33}^T / \epsilon_0$	$\text{tg}\delta$, less than	K_p more than	Q_m	$ d_{31} $, pC/N	d_{33} , pC/N	$T_c, ^\circ\text{C}$
PZT-19	1620-1980	0,010	0,50	50-120	150-200	310-460	290
PKP -11	2700-3000	0,025	0,55	60-80	220-250	600-650	180
PKP -12	3500-4500	0,030	0,55	60-100	270-330	700-800	180
PKP -14	1950-2200	0,020	0,56	60-70	170-190	350-410	250



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