Supplementary Materials

Figure S1. Cross section of the body of the valve milled in polycarbonate.



Figure S2. The graph illustrates the displacement of the loaded piezoelectric actuators as a function of frequency. Above 400 Hz, the inertia of the steel pushrod decreased the amplitude of motion of the actuator.



Figure S3. The graph shows characteristic parameters of square signal.



Figure S4. The displacement of the loaded piezoelectric actuator as a function of voltage applied to the actuator.



Figure S5. (a) The graph shows the pre-programmed (black line) and measured (grey line) volumes of droplets produced at 400 Hz in our system. The droplets were formed in $100 \times 100 \ \mu\text{m}^2$ square cross-section channel. (b) The graph illustrates the same sequence of droplets and shows the accuracy in forming of droplet on demand. Pearson correlation coefficient between measured and programmed volume of droplet is 0.9991.



Table S1. The comparison between the pre-programmed and measured volumes of droplets formed by the piezoelectric valve (the exemplary data). The droplets were formed at a constant frequency 400 Hz in 10-droplet series for a $100 \times 100 \ \mu\text{m}^2$ channel. The obtained results confirmed that the order of the resolution of forming droplets is 10 pL and the precision of forming droplets is less than 1%.

	Pre-programmed	Pre-programmed	Pre-programmed	Pre-programmed
	volume 1 nL	volume 1.01 nL	volume 1.02 nL	volume 1.03 nL
	0.9864	1.0075	1.0234	1.0194
	1.0081	1.0000	1.0192	1.0411
	0.9920	1.0115	1.0214	1.0119
	0.9966	1.0148	1.0195	1.0325
Measured	0.9959	1.0061	1.0120	1.0344
volumes (nL)	0.9789	1.0128	1.0235	1.0358
	0.9995	1.0026	1.0268	1.0256
	1.0014	1.0000	1.0181	1.0230
	0.9972	0.9934	1.0248	1.0164
	0.9994	1.0101	1.0146	1.0288
Mean (nL)	0.9955	1.0059	1.0203	1.0269
Standard deviation (nL)	0.0082	0.0068	0.0046	0.0093

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