Supplementary Data S1

DNA and RNA oligonucleotides

DNA oligonucleotides for siQuant vector construction

siQuant-f	5′-GATCTCAAGTGTCAGTGCGCAGCTGAACGGGCC-3′
siQuant-r	5′-CGTTCAGCTGCGCACTGACACTTGA-3′

RT-PCR primers

Lamin-F	5′-GCAAAGTGCGTGAGGAGTTTA-3′
Lamin-R	5′-GAGTTCAGCAGAGCCTCCAG-3′
Actin-F	5′-CCAACCGCGAGAAGATGA-3′
Actin-R	5′-CCAGAGGCGTACAGGGATAG-3′
ANXA2-F	5′-GCCTCCATGAAGGGGCTGGG-3′
ANXA2-R	5′-GGGCAACCATCAGCTTGCGG-3′
DGAPDH-F2	5′-ATCACTGCCACCCAGAAGAC-3′
DGAPDH-R2	5′-GGCAGGTCAGATCCACAACT-3′

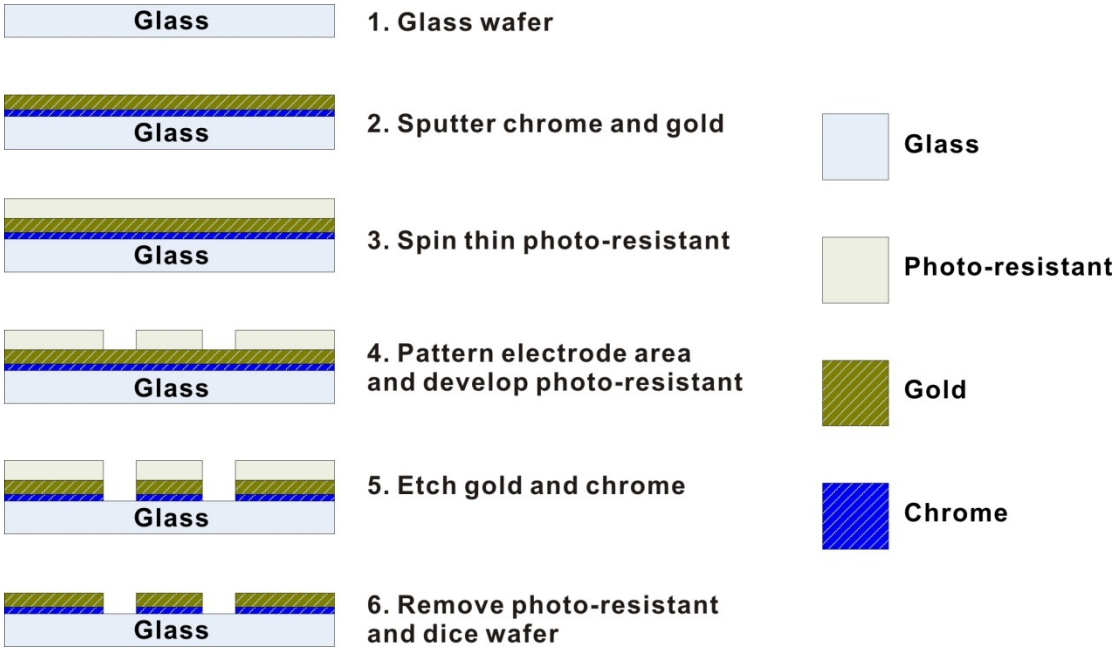
siRNA oligonucleotides

Anti-Lamin sense	5′-CUGGACUUCCAGAAGAACAdtdt-3′
Anti-Lamin antisense	5′-UGUUCUUCUGGAAGUCCAGdtdt-3′
Anti-Actin sense	5′-UGAAGAUCAAGAUCAUUGCdtdt-3′
Anti-Actin antisense	5′-GCAAUGAUCUUGAUCUUCAdtdt-3′
Anti-ANXA2-1 sense	5′-GGACCAACCAAGAACUUCAdtdt-3′
Anti-ANXA2-1 antisense	5′-UGAAGUUCUUGGUUGGUCCdtdt-3′
Anti-ANXA2-2 sense	5′-GGAUGGGUCUGUCAUCGAUdtdt-3′
Anti-ANXA2-2 antisense	5′-AUCGAUGACAGACCCAUCCdtdt-3′
Anti-siQ sense	5′-GUGUCAGUGCGCAGCUGAAdtdt-3′
Anti-siQ antisense	5′-UUCAGCUGCGCACUGACACdtdt-3′
NC sense	5′-UUCUCCGAACGUGUCACGUdtdt-3′

NC antisense 5′-ACGUGACACGUUCGGAGAAdtdt-3′

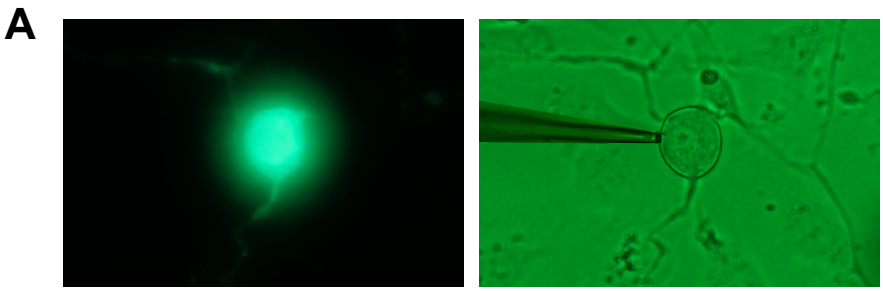
Supplementary Data S2

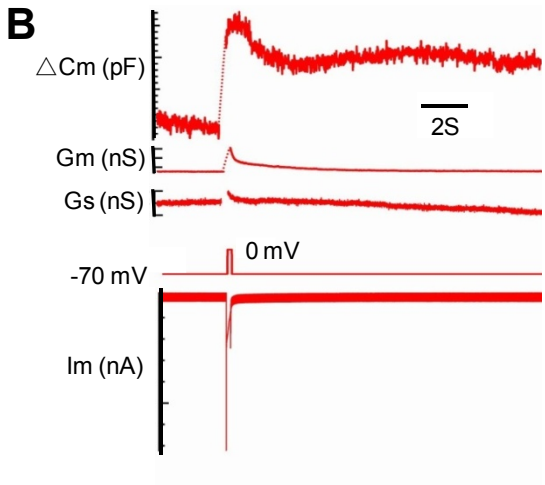
Procedures of electroporation chip fabrication



Supplementary Data S3

Depolarization-induced capacitance changes in electroporated DRG neuron. (A) Fluorescent and differential interference contrast image of a patch-clamped DRG neuron after electroporation. (B) Action potential induces normal capacitance changes in transfected neuron. All traces are recorded from single DRG cell.





Supplementary Data S4

Commercially available electroporation systems

	Company	Product	Type	Voltage	Buffer	Note
1	**Ambion**	siPORTer™-96 Electroporation Chamber		200-1200v 50-400us 1-5 pulses	confidential	Bio-Rad Gene Pulser Xcell™ with CE module electropulse generator
2	**Amaxa**	Nucleofector™ II	cuvette	conficential	confidential	cell-type-specific Nucleofector solution
		96-well Shuttle	2×8 Nucleocuvette modules		confidential	an innovative conductive polymer material. No metal ions are released into the cell suspension during nucleofection
3	**Bio-rad**	Gene Pulser Xcell	cuvette	square and exponential	confidential	
		Gene Pulser MXcell	12, 24, 96-well plate	specific protocols	confidential	
4	**BTX**	generator: ECM-630,830,2001	cuvette/96,25-welll plate			petri pulser/petri dish electrode and suitable for *in vivo* applications
5	**Eppendorf**	Multiporator	cuvette-2, 4mm	100-300v	available	Soft Pulse technology (US range), microprocessor-controlled pulse discharge, buffer system
6	**Invitrogen**	Neon™ Transfection System	tube	~1000v 10-30ms	confidential	a new electroporation model different from cuvette, avoiding cathod effects

Supplementary Data S5

Comparison of micro-chip based devices

Device	Huang	Olbrich	Suzuki	Valley	**Our Device**
Electrode shape	Rectangular Comb	Rectangular Comb	Orifice	Parallel Plate	**Annular Interdigital**
Multi-well plates system	No	No	No	No	**Yes**
Transfection rate	40% with BCC	15% with HEK-293	Single Cell Operation	Single Cell Operation	**90% with HEK-293**
Adherent cell	No	Yes	Yes	No	**Yes**
Suspension cell	Yes	No	No	Yes	**Yes**

Reference

K. S. Huang, Y. C. Lin, C. C. Su and C. S. Fang, *Lab Chip*, 2007, **7**, 86-92.

M. Olbrich, E. Rebollar and J. Heitz et al., *Appl Phys Lett*, 2008, **92**, 013901.

Y. C. Lin, M. Li and C. C. Wu, *Lab Chip*, 2004, **4**, 104-108.

T. Jain and J. Muthuswamy, *Lab Chip*, 2007, **7**, 1004-1011.

J. K. Valley, S. Neale and H. Y. Hsu, *Lab Chip*, 2009, **9**, 1714-1720.

Supplementary Data S6

Quantitative RT-PCR

Quantitative RT-PCR was performed using the Mastercycler ep realplex (Eppendorf) in combination with SYBR Green (Roche Applied Science, Mannheim, Germany). Briefly, total RNA was extracted using Trizol reagent (Invitrogen). RNA (2 µg) was reverse-transcribed to first-strand cDNA using oligo(dT) primer and an ImProm-II Reverse Transcriptase kit (Promega). The PCR profile was: 95°C for 30 s and 35 cycles at 95°C for 30 s, 61°C for 30 s, and 72°C for 30 s. The amount of SYBR Green was measured at the end of each cycle. The cycle number at which the emission intensity of the sample rose above baseline was referred to as the threshold cycle and was proportional to the target concentration. Presented data are the average of three independent assays.

Western blot assay

Cultured HEK-293, MDCK or HUVEC cells were harvested and lysed in ice-cold Cell Lysis Buffer (Cell Signaling) and clarified by centrifugation at 10,000 rpm for 5 minutes, in the presence of a cocktail of protease inhibitors (Sigma). For western blot analysis, proteins were electrophoresed on 10% SDS-PAGE and transferred to polyvinylidene difluoride membranes (Bio-Rad,

CA). The membrane was blocked with 5% non-fat dry milk in Tris-buffered saline-0.1% Tween-20 (TBS-T) and incubated overnight with an antibody reacting with Lamin A/C (Cell Signaling Technology), GAPDH (Santa Cruz) or ANXA2 (Santa Cruz) at 4°C overnight. Then, the membrane was washed and incubated with secondary antibody conjugated with horseradish peroxidise in 5% non-fat milk in TBS-T buffer for 1-2 hours. Detection was carried out using a chemiluminescence detection kit (ChemiDoc XRS system, Bio-Rad).