Electronic Supplementary Material (ESI) for Lab on a Chip

Improved Silicon Nanowire Field-effect Transistors for Fast Protein-protein Interaction Screening

(Supplementary Information)

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Table S1. CalnI-interacting candidates

Classification	Accession no. (Swiss-Prot)	Protein description	pI	Sequence coverage (%)	Mean error (ppm)	Cellular role
Cytoskeletal regulation	P60711	α-actin	5.29	42.9	1	Cytoskeletal protein
	P45592	Cofilin-1	8.22	15.7	<1	Actin-depolymerizing factor
	Q7M0E3	Destrin	7.30	8.2	1	Actin-depolymerizing factor
	Q68FP1	Gelsolin	5.76	2.2	<1	Actin-depolymerizing factor
Vesicle transportation	Q07936	Annexin A2	7.55	20.4	<1	Calcium-regulated membrane-binding
	P07150	Annexin A1	6.97	8.1	<1	Calcium/phospholipid-binding
	Q6B345	Protein S100-A11	5.61	21.4	2	Ca^{2+} binding
Protein folding	Q07439	Heat shock 70 protein 1A/1B	5.61	11.4	<1	Molecular chaperone
	P63018	Heat shock cognate 71 kDa protein	5.37	5.6	<1	Molecular chaperone

	P04785	Protein disulfide-isomerase	4.82	3.1	<1	Catalyzes the rearrangement of disulfide bonds
	P42930	Heat shock protein beta-1	6.12	4.9	<1	Molecular chaperone
	P10111	Peptidyl-prolyl cis-trans isomerase A	8.34	8.5	<1	Catalyzes the cis-trans isomerization of proline imidic peptide bonds
Signal transduction	P63102	14-3-3 protein zeta/delta	4.73	16.3	<1	Adapter protein
	P68511	14-3-3 protein eta	4.81	6.5	2	Adapter protein
	P38983	40S ribosomal protein SA	4.80	14.9	2	Receptor for laminin
	P09527	Ras-related protein Rab-7a	6.80	6.4	<1	Small GTPase signaling
Glycolysis	P04764	α-enolase	6.16	10.6	<1	Glycolytic enzyme
	P48500	Triosephosphate isomerase	6.89	11.2	1	Glycolytic enzyme
	P04642	L-lactate dehydrogenase A chain	8.45	8.1	1	Glycolytic enzyme
	P25113	Phosphoglycerate mutase 1	6.67	8.3	1	Glycolytic enzyme

Protein biosynthesis	P05197	Elongation factor 2	6.41	4.3	2	Catalyzes ribosomal translocation during translation elongation
	P62630	Elongation factor 1-alpha 1	9.10	7.6	1	Promotes the binding of aminoacyl-tRNA to the A-site of ribosomes
Others	Q6P0K8	Junction plakoglobin	5.75	26.3	1	Desmosome protein
	P62982	Ubiquitin-40S ribosomal protein S27a	9.68	10.3	<1	Proteolysis
	P55053	Fatty acid-binding protein, epidermal	6.73	6.7	1	Lipid binding

Neuronal cell lysate was passed through the CalnIΔHT modified SiNW-FET in the presence of Ca^{2+} and the bound proteins were eluted for MS analysis. Proteins with sequence coverage of > 2% and a mean error of < 2% are listed and classified into 7 categories. The pIs and brief descriptions of functions are provided.

Table S2. Nonspecific binding of the neuronal lysate to the GST/SiNW-FET device.

Accession no. (Swiss-Prot)	Protein description	pI	Sequence coverage (%)	Mean error (ppm)
P68370	Tubulin α1A chain	4.94	10.6	0
P06302	Prothymosin α	3.75	25.9	<1
P69897	Tubulin β5 chain	4.78	6.8	<1
P02091	Hemoglobin subunit β1	7.88	15.6	<1
P15865	Histone H1.2	11.1	7.3	1
P63312	Thymosin β10	5.31	31.8	1
P62161	CaM	4.09	8.7	1
P62329	Thymosin β	5.02	31.8	1

The molecules in the neuronal lysate that was bound onto the GST/SiNW-FET were eluted and used for MS analysis. Proteins with sequence coverage of > 2% and mean errors of < 2% are listed. pI: isoelectric point

Figure S1. The MS fragmentation spectra of the eluted GST-CaM, GFP-CaMKIIα, and GST-CalnIΔHT.

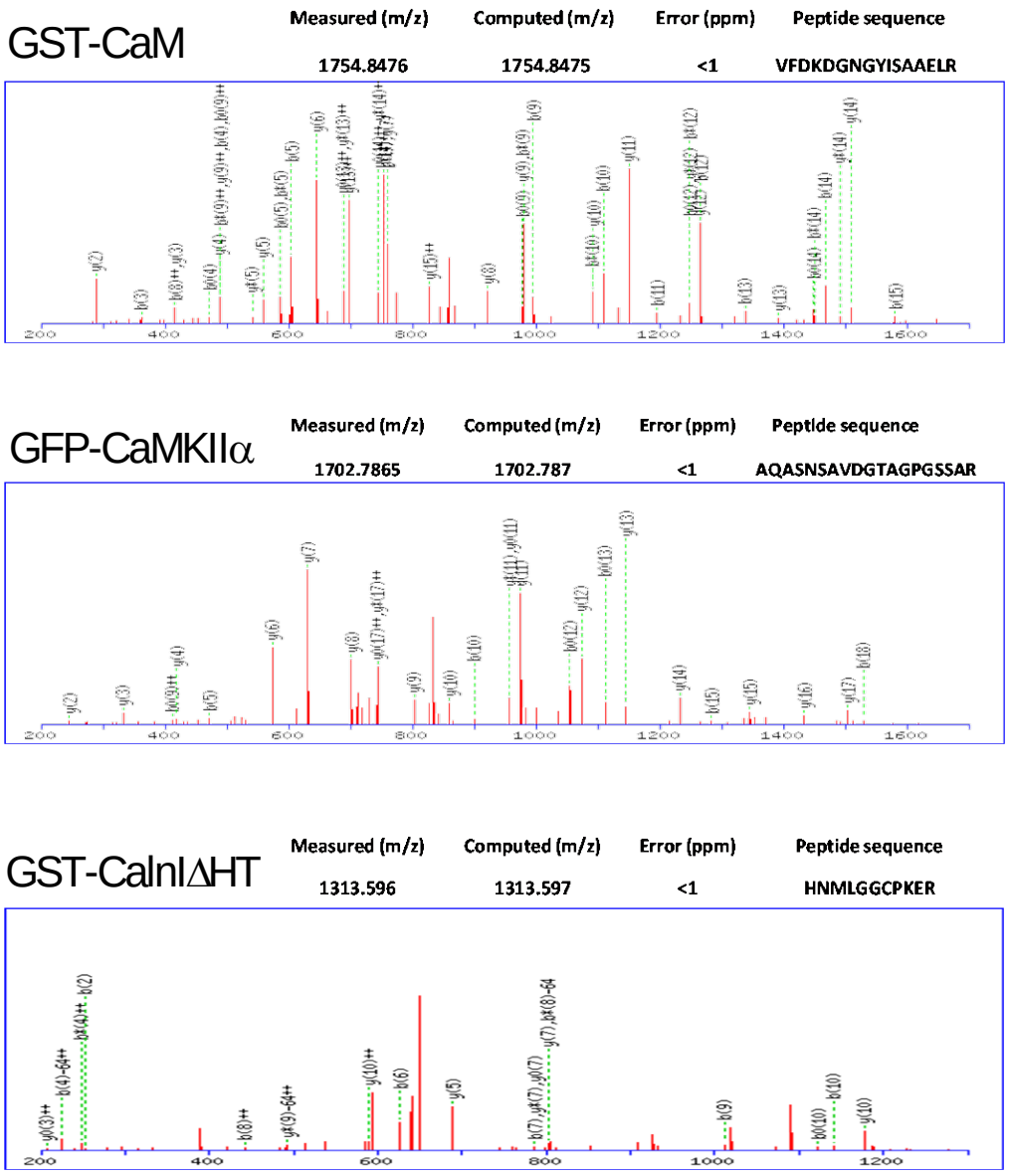

Figure S2. A GST/SiNW-FET did not respond to the neuronal cell lysate in the presence of Ca^{2+}.

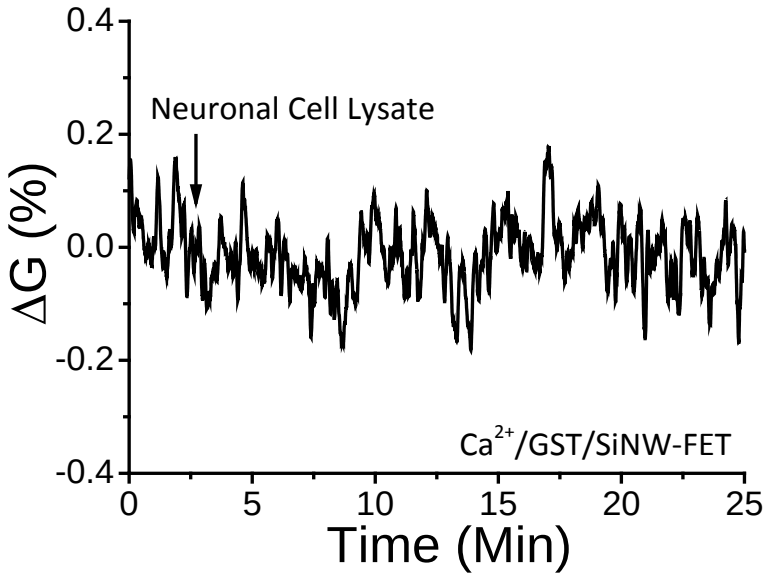

Figure S3. CalnI did not interact with the denatured Hsp70. Denatured Hsp70, which was boiled in water for 10 min, had no effect on the electrical conductance of the Ca^{2+}/CalnIΔHT/SiNW-FET. After replacing the denatured Hsp70 with native Hsp70, an increase in the conductance was observed.