

**Genetically encoded biosensors based on engineered fluorescent proteins**

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**Supplementary Table I.** List of biosensors based on single polypeptide chains

	<b>Biosensor specificity</b>	<b>Representative biosensor(s)</b>	<b>Reference(s)</b>
<b>Translocation-based biosensors</b>			
	PtdIns(4,5)P <sub>2</sub> :Ins(1,4,5)P <sub>3</sub> dynamics	GFP-PH <sub>PLCδ</sub> , CYPHR	1-3
	PtdIns(3,4,5)P <sub>3</sub>	GFP-ARNO; CFP-AktPH	4,5
	1,2-diacylglycerol	Cys1-GFP, DAGR	3,6
<b>Single FP-based <i>intrinsic</i> biosensors</b>			
	pH	pHluorins; deGFP1-4; E <sup>2</sup> GFP	7-9
	halide ions	YFP-H148Q	10
	redox	roGFP1,2	11,12
	redox (superoxide)	cpYFP	13
<b>Single FP-based <i>extrinsic</i> biosensors</b>			
	Ca <sup>2+</sup>	Camgaroo; Pericam; G-CaMP; Case12	14-17
	ATP:ADP ratio	Perceval	18
	cGMP	FlinCG	19
	voltage	FlaSh; SPARC	20,21
	redox (H <sub>2</sub> O <sub>2</sub> )	HyPer	22
<b>FRET-based biosensors</b>			
<b>For imaging of ions</b>	Ca <sup>2+</sup>	Cameleons; FIP-CB <sub>SM</sub> ; TN-XXL	23-26
	Zn <sup>2+</sup>	CLY9-2His; Cys <sub>2</sub> His <sub>2</sub>	27,28
	Cl <sup>-</sup>	Clomeleon; Cl-sensor	29,30
	PO <sub>4</sub> <sup>2-</sup>	FLIPPi	31
	pH	CFP-YFP tandem	32
<b>For imaging of metabolites</b>	cAMP	CFP-Epac-YFP; ICUE1; HCN2-camps	33-35

	cGMP	CGY; Cygnet; cGES-DE5, cGi series	36-39
	PtdIns(3,4)P <sub>2</sub> , PtdIns(4,5)P <sub>2</sub> , PtdIns(3,4,5)P <sub>3</sub>	CAY	40
	inositol 1,4,5-trisphosphate	LIBRA	41
	diacylglycerol	Daglas	42
	BAI2 (a furanosyl borate diester)	CLPY	43
	various sugars	FLIP series	44-47
	various amino acids	FLIP series; Arg sensor; GluSnFR	46,48-50
<b>For imaging of kinase activity</b>	Protein kinase A	ART; AKAR1-3	51-53
	Protein kinase B/Akt	Aktus; BKAR	54,55
	Protein kinase C	CKAR; KCP-1	3,56
	Protein kinase D	DKAR	57
	epidermal growth factor receptor (EGFR)	EGFR reporter	58
	Abl	Crk-based reporter	58
	ABI, EGFR	Picchu	59
	Src	Src reporter	60
	Insulin Receptor	Phocus	61
	ATM	ATOMIC	62
Extracellular signal-regulated kinase (ERK)	EAS; Erkus	63,64	
Aurora B kinase	aurora B sensor	65	
<b>For imaging of other enzyme activities</b>	various proteases	donor FP-substrate-acceptor FP	66
	histone lysine methylation	K9 reporter; K27 reporter	67
	O-GlcNAc transferase	O-GlcNAc sensor	68
	protein phosphatase (calcineurin)	CaNAR1	69
<b>For imaging of redox and voltage</b>	voltage	VSFP2, Mermaid	70,71
	redox	HSP-FRET; CY-RL5,6	72,73
<b>For imaging of protein activation and conformational changes</b>	Rho family GTPase activation	Raichu-Ras, -Rap1, -Rac, -Cdc42; RhoA biosensor	74-76
	MAP kinase-activated protein kinase 2 conformation	GMB	77
	Akt conformation	GFP-Akt-YFP; ReAktion	78,79

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PKB conformation	GFP-PKB-RFP	80
Wiskott -Aldrich syndrome protein (WASP) conformation	Cdc42-GEF sensors	81
CaMKII conformation	Camuia; CYCaMII $\alpha$	82,83
Estrogen receptor ligand binding domain conformation	CEY	84
ERK conformation	Miu2	85
activation of plasma membrane Ca <sup>2+</sup> pump	BFP-PMCA-GFP	86
Annexin A4 self-association	CYNEX4	87

The references provided are not necessarily the primary report of the biosensor. In some cases we have identified recent representative papers that contain references to the earlier work.

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