Supplementary table 1A   Hill function fitting results for gene expression
repression by LEVI mutants.

Parameter	LEVI		LEVI (M165I M135)		LEVI (I74V)		Unit
	Best-fit value	Fit standard error	Best-fit value	Fit standard error	Best-fit value	Fit standard error	
a	100.014	0.008	97	3	100.000	0.006	
b	0.0008	0.0006	0.015	0.011	0.010	0.007	
n	1.07	0.05	1.7	0.2	2.89	0.07	
k	0.0026	0.0004	0.0007	0.0003	0.050	0.001	W/m^2

Data fitted to repressing Hill function $[b + (a*k^n)/(Ir^n + k^n)]$ using the method of least squares[1].

b represents the leak expression when cells were illuminated with light of infinite intensity.
a+b represents the maximal expression in darkness.
n represents Hill coefficient.
k represents the light intensity for half-maximal response.

Supplementary table 1B Comparison of gene expression methodologies in *Escherichia coli*.

	LightOff system	**pET system[2]**	**pBAD system[3]**	**Cph1/OmpR[1,4-6]**	**ccaS/ccaR[1,5,6]**	**FixJ/YF1[7]**
Regulator	blue light	lactose or its analogs	arabinose	red light	green light	blue light
Inducer toxicity	low	high	low	low	low	low
Components	LEVI	LacI	AraC	ompR and Cph8	CcaR and CcaS	FixJ and YF1
Induction efficiency	similar to T7 promoter	T7 promoter	lower than T7 promoter	N.D	N.D	20% of T7 promoter[a]
leakage	extremely low	high[a]	low	N.D	N.D	high[a]
Induction ratio	~10,000-fold	~200-fold[a]	~1,700-fold[a]	72-fold [6]	117-fold [6]	16-fold for pDusk[a]
Host *E.coli* strain	all strains	with *DE3*	*ara*BADC- and *ara*EFGH+	*envZ* deleted	N.D	N.D
Reversibility	Reversible	reversible but difficult	reversible but difficult	reversible	reversible	N.D
Spatial control	Yes	no	no	yes	yes	yes
Gradient induction	Yes	no	yes	yes	yes	yes
Light sensitivity[c]	2.6 mW·m^{-2} blue light for LEVI. 0.71 mW·m^{-2} blue light for LEVI (M135I M165I). 50 mW·m^{-2} blue light for LEVI (I74V)			24 mW·m^{-2} red light [1].	10 mW·m^{-2} green light or 138 mW·m^{-2} green light in the presence of inhibiting red light[1]	22 mW·m^{-2} blue light in *BL21(DE3)* strain[a]
Additional	LEVI allows adaptability in controlling transcriptional activities of various promoters.	*BL21(DE3) pLysS* strain containing pLysS plasmid can be used to reduce leak expression, but with reduced induction efficiency	Leak expression levels may be further repressed in the presence of glucose.	ho1 and pcyA convert haem into phycocyanobili which is required for the function of light sensors.	ho1 and pcyA convert haem into phycocyanobili which is required for the function of light sensors.	A cI/P$_R$ circuit enables higher induction efficiency and 460-fold induction ratio in a specific riboflavin-auxotrophic E. coli strain [b]

N.D. Not determined or not available. [a]in this study. [b] from the published data. [c]Light sensitivity refers to the light intensity required for 50% response.