NEPA21 and CUY21 System
In Ovo
Parameter and Electrode Recommendations

Application	Publication Title	Electrode	Voltage	P on	P off	No. of Pulses
Chick Embryo (In Ovo)	Towers et al. Integration of growth and specification in chick wing digit-patterning Nature, Volume 452, Number 7189, Pages 882-886, 17 April 2008		40V	50ms	200ms	2
	Chang et al. Bmp4 Is Essential for the Formation of the Vestibular Apparatus that Detects Angular Head Movements PLoS Genetics, Volume 4, Issue 4, e1000050, 11 April 2008		10V	50ms		2
	Sun et al. Expression dynamics of the LIM-homeobox genes, Lhx1 and Lhx9, in the diencephalon during chick development The International Journal of Developmental Biology, Volume 52, Number 1, Pages 33-41, 2008	CUY610P4-1	25V	50ms	999ms	5
	Ladher et al. FGF8 initiates inner ear induction in chick and mouse Genes and Development, Volume 19, Issue 5, Pages 603-613, March 2005	CUY613P2X2	7V	50ms	100ms	5
	Matsunaga et al. RGM and its receptor neogenin regulate neuronal survival.	CUY610 series	20V	50ms		4

Application	Publication Title	Electrode	Voltage	P on	P off	No. of Pulses
	Nature Cell Biology, Volume 6, Issue 8, Pages 749-755, August 2004					
	Nakamura et al. Gain- and loss-of-function in chick embryos by electroporation Mechanisms of Development, Volume 121, Issue 9, Pages 1137-1143, September 2004	CUY611P3-1 CUY6111 series CUY614 & CUY615	25V 7-8V	50ms 25ms		3-5 2
	Wakamatsu et al. Multiple roles of Sox2, an HMG-box transcription factor in avian neural crest development Developmental Dynamics, Volume 229, Issue 1, Pages 74-86, January 2004	Cultured Embryo: As described on Endo et al. 2002 In ovo: CUY611P3-1	7V 25V	25ms 50ms	200ms 250ms	3 5
	Toyofuku et al., Dual roles of Sema6D in cardiac morphogenesis through region-specific association of its receptor, Plexin-A1, with off-track and vascular endothelial growth factor receptor type 2 Genes & Development, Volume 18, Issue 4, Pages 435-447, 15 February 2004	CUY611 series CUY614 & CUY615	8V	90ms		3
	Tatsuya Katahira and Harukazu Nakamura Gene silencing in chick embryos with a vector-based small interfering RNA system. Development Growth & Differentiation, Volume 45, Issue 4, Pages 361-367, August 2003	As described on Funabashi et al. 1999 ; Nakamura et al. 2000				
	Sayaka Sugiyama and Harukazu Nakamura The role of Grg4 in tectal laminar formation	CUY611 series CUY614 & CUY615	7-8V	25ms		2

Application	Publication Title	Electrode	Voltage	P on	P off	No. of Pulses
	Development, Volume 130, Issue 3, Pages 451-462, February 2003					
	Sakiyama et al. Tbx4-Fgf10 system controls lung bud formation during chicken embryonic development *Development*, Volume 130, Issue 7, Pages 1225-1234, April 2003	CUY611 series CUY614 & CUY615	HH7-10: 5-9V HH10-12: 9-14V	50-90ms		1-2
	Takeuchi et al. Tbx5 and Tbx4 trigger limb initiation through activation of the Wnt/Fgf signaling cascade Development, Volume 130, Issue 12, Pages 2729-2739, June 2003	CUY612P5-5-3 CUY612P6-3	7-9V	60ms	50ms	3-5
	Takeuchi at el. Tbx5 specifies the left/right ventricles and ventricular septum position during cardiogenesis Development, Volume 130, Issue 24, Pages 5953-5964, December 2003	CUY613 series	5V 1.0kΩ	40ms		3
	Jin et al. Irx4-mediated regulation of Slit1 expression contributes to the definition of early axonal paths inside the retina Development, Volume 130, Issue 6, Pages 1037-1048, March 2003	CUY611 series CUY614 & CUY615	15V	50ms		3
	C.-M. Amy Chen and Constance L. Cepko The chicken RaxL gene plays a role in the initiation of photoreceptor differentiation Development, Volume 129, Issue 23, Pages 5363-5375,	CUY611 series CUY614 & CUY615	10V	50ms	950ms	3

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	December 2002					
	Treubert-Zimmemann et al. Targeting Axons to Specific Fiber Tracts In Vivo by Altering Cadherin Expression The Journal of Neuroscience, Volume 22, Issue 17, Pages 7617-7626, 1 September 2002	CUY610 series or CUY611 series	25V	50ms	100ms	6
	Oberg et al. Efficient ectopic gene expression targeting chick mesoderm Developmental Dynamics, Volume 224, Issue 3, Pages 291-302, July 2002	Custom-made CUY614 & CUY615	75V	25ms	50ms	10
	Sato et al. Inductive signal and tissue responsiveness defining the tectum and the cerebellum Development, Volume 128, Issue 13, Pages 2461-2469, July 2001	CUY611 series	25V	50ms	950ms	4
	Nakamura et al. Misexpression of genes in brain vesicles by in ovo electroporation Development Growth & Differentiation, Volume 42, Issue 3, Page 199-201, June 2000	CUY611P3-1 CUY580	25V	50ms	950ms	5
	Itasaki et al. 'Shocking' developments in chick embryology: electroporation and in ovo gene expression Nature Cell Biology, Volume 1, Issue 8, Pages E203-E207, December 1999	CUY611 series CUY520P5	15V 25-35V	50ms		5

Application	Publication Title	Electrode	Voltage	P on	P off	No. of Pulses
Chick Embryo (New Culture)	Kinoshita et al. Apical Accumulation of Rho in the Neural Plate Is Important for Neural Plate Cell Shape Change and Neural Tube Formation Molecular Biology of the Cell, Volume 19, Issue 5, Pages 2289-2299, May 2008	As described previously (Kobayashi el al. 2002)	5V			
	Iimura et al. Dual mode of paraxial mesoderm formation during chick gastrulation PNAS, Volume 104, Number 8, Pages 2744-2749, 20 February 2007	CUY701P2E CUY195P0.3	8V	50ms		5
	Tadahiro Iimura and Olivier Pourquie Collinear activation of Hoxb genes during gastrulation is linked to mesoderm cell ingression Nature, Volume 442, Number 7102, Pages 568-571, 3 August 2006	CUY701P2E CUY195P0.3	8V	50ms		5
	Wakamatsu et al. Multiple roles of Sox2, an HMG-box transcription factor in avian neural crest development Developmental Dynamics, Volume 229, Issue 1, Pages 74-86, January 2004	Cultured Embryo: As described in Endo et al. 2002 In Ovo: CUY611P3-1	7V 25V	25ms 50ms	200ms 250ms	3 5
	Catherine E. Krull A primer on using in ovo electroporation to analyze gene function Developmental Dynamics, Volume 229, Issue 3, Pages 433-					

Application	Publication Title	Electrode	Voltage	P on	P off	No. of Pulses
	439, March 2004					
	Toyofuku et al., Dual roles of Sema6D in cardiac morphogenesis through region-specific association of its receptor, Plexin-A1, with off-track and vascular endothelial growth factor receptor type 2 Genes & Development, Volume 18, Issue 4, Pages 435-447, 15 February 2004	CUY611 series CUY614 & CUY615	8V	90ms		3
	Endo et al. Bimodal functions of Notch-mediated signaling are involved in neural crest formation during avian ectoderm development Development, Volume 129, Issue 4, Pages 863-873, February 2002	CUY701P2E CUY613 series	5V 7V	25ms	175ms	3
	Kobayashi et al. Early subdivisions in the neural plate define distinct competence for inductive signals Development, Volume 129, Issue 1, Pages 83-93, January 2002	CUY701P2E, CUY701P2L	10V	50ms		5
Chick	Yamaguchi et al. In-vivo gene transfer into newly hatched chick brain by electroporation Neuroreport, Volume 18, Issue 8, Pages 735-739, 28 May 2007	CUY567	40V	2ms	98ms	5