

---

Article

# Renewable DNA proportional-integral controller with photoresponsive molecules

Masaaki Tamba<sup>1</sup>, Keiji Murayama<sup>2</sup> , Hiroyuki Asanuma<sup>2</sup>  and Takashi Nakakuki<sup>3\*</sup> 

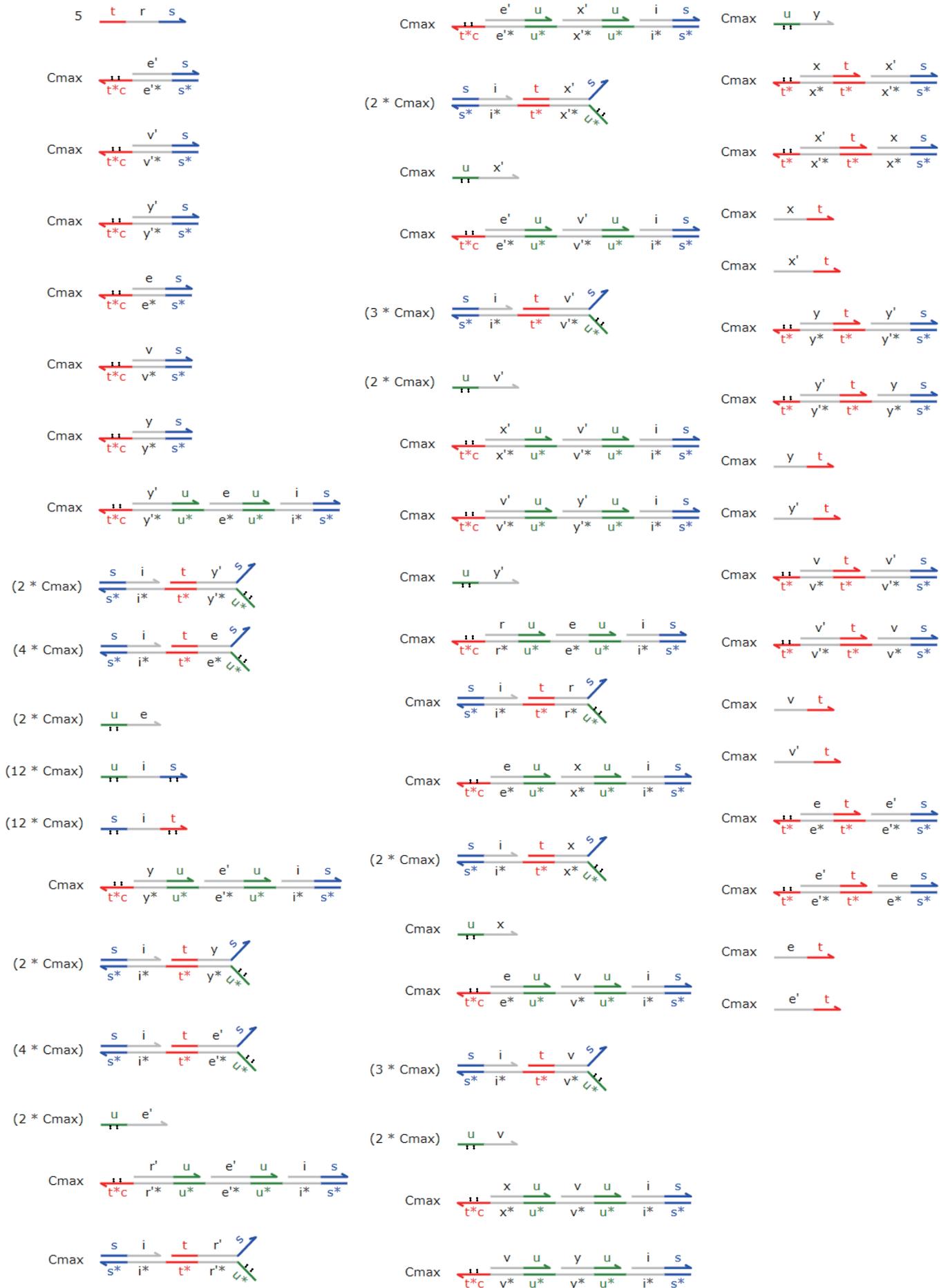
<sup>1</sup> Department of Systems Design and Informatics, Kyushu Institute of Technology, Iizuka, Fukuoka 8208502, Japan, tamba.masaaki231@mail.kyutech.jp

<sup>2</sup> Department of Biomolecular Engineering, Graduate School of Engineering, Nagoya University, Furo-cho, Chikusa-ku, Nagoya 4648603, Japan

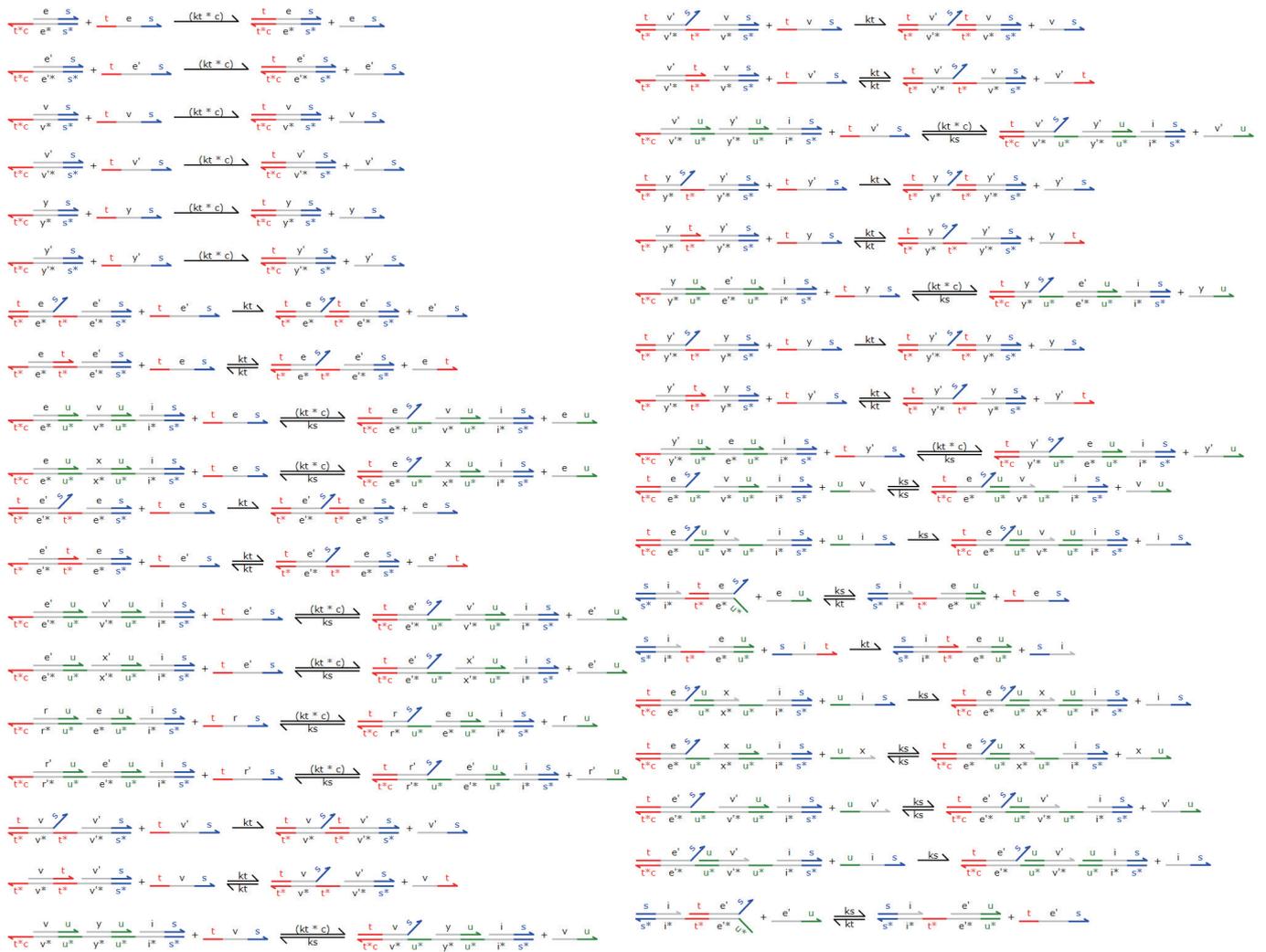
<sup>3</sup> Department of Intelligent and Control Systems, Kyushu Institute of Technology, Iizuka, Fukuoka 8208502, Japan, nakakukil@ces.kyutech.ac.jp

\* Correspondence: nakakukil@ces.kyutech.ac.jp; Tel.: +81-948-29-7716 (F.L.)

---



**Figure S1.** Initial concentration of PI controller.  $C_{max}=1000$  nM. Domain  $x$  refers to domain  $z$  in the main text, and domain  $r$  refers to domain  $u$  in the main text.



**Figure S2.** First DNA Strand Displacement of PI controller. Domain x refers to domain z in the main text, and domain r refers to domain u in the main text.  $k_t = k_u = 1.0 \times 10^{-3}$ .



**Figure S3.** Second DNA Strand Displacement of PI controller. Domain x refers to domain z in the main text, and domain r refers to domain u in the main text.  $k_t = k_u = 1.0 \times 10^{-3}$ .