Supplementary Information to "A visible light-triggered artificial photonic nociceptor with adaptive tunability of threshold"

Guodong Gong,[a,b,c] Shuang Gao,*[a,b] Zhuolin Xie,[a,b,c] Xiaoyu Ye,[a,b,c] Ying Lu,[a,b,c] Huali Yang,[a,b] Xiaojian Zhu,[a,b] and Run-Wei Li*[a,b]

[a]*CAS Key Laboratory of Magnetic Materials and Devices, Ningbo Institute of Materials Technology and Engineering, Chinese Academy of Sciences, Ningbo 315201, P. R. China. E-mail: gaoshuang@nimte.ac.cn, runweili@nimte.ac.cn*

[b]*Zhejiang Province Key Laboratory of Magnetic Materials and Application Technology, Ningbo Institute of Materials Technology and Engineering, Chinese Academy of Sciences, Ningbo 315201, P. R. China*

[c]*College of Materials Science and Opto-Electronic Technology, University of Chinese Academy of Sciences, Beijing 100049, P. R. China*

Fig. S1 XRD spectrum of the CeO_{2-x} thin film deposited on a glass substrate.

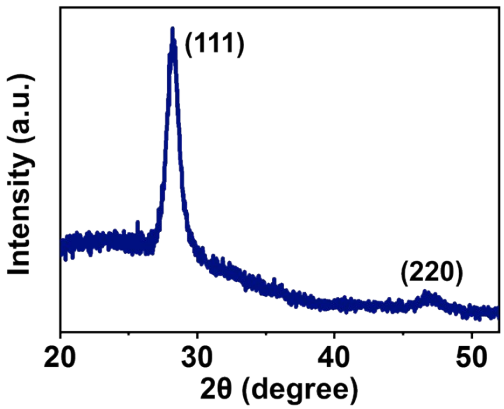

Fig. S2 Surface morphology of the CeO_{2-x} thin film.

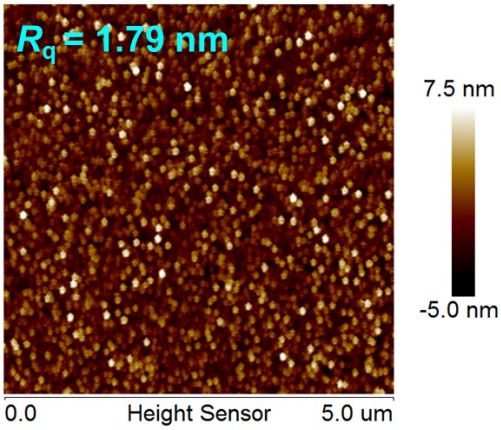

Fig. S3 Photocurrent response of the device under different read voltages but a fixed green optical intensity of 90 pW/μm^2. The inset shows the magnified current relaxation processes after removal of the optical irradiation.

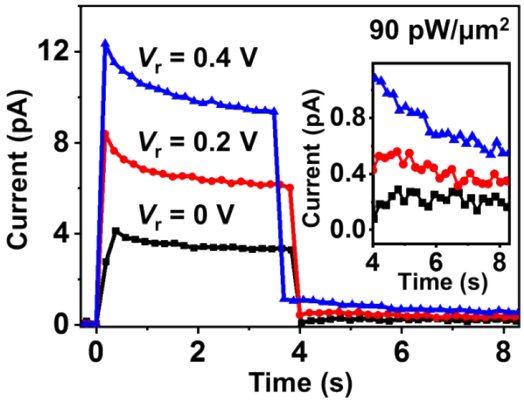

Fig. S4 Photocurrent response of the device to multiple green optical pulses with the intensities of 5 (a) and 11 (b) pW/μm^2. Pulse width, 0.2 s.

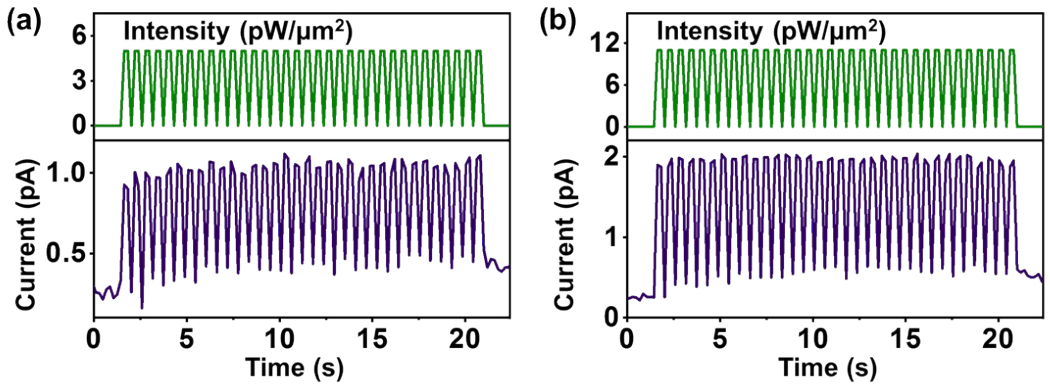

Fig. S5 Schematic mechanism for the relaxation process of the device. After the removal of optical irradiation, the re-trapped free electrons can be gradually detrapped from the shallow oxygen vacancies due to metastability, thus generating a notable relaxation current.

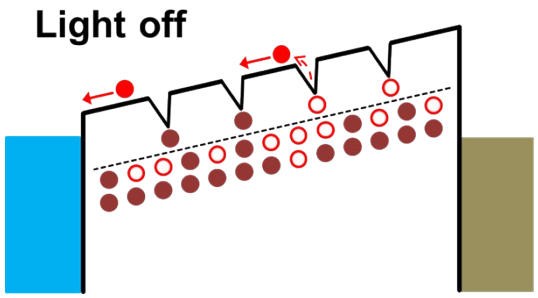

Fig. S6 Raw data for demonstrating the allodynia and hyperalgesia characteristics in Fig. 4d. (a-f) The damaging illumination intensity is 110 pW/μm^2. (g-j) The damaging illumination intensity is 130 pW/μm^2.

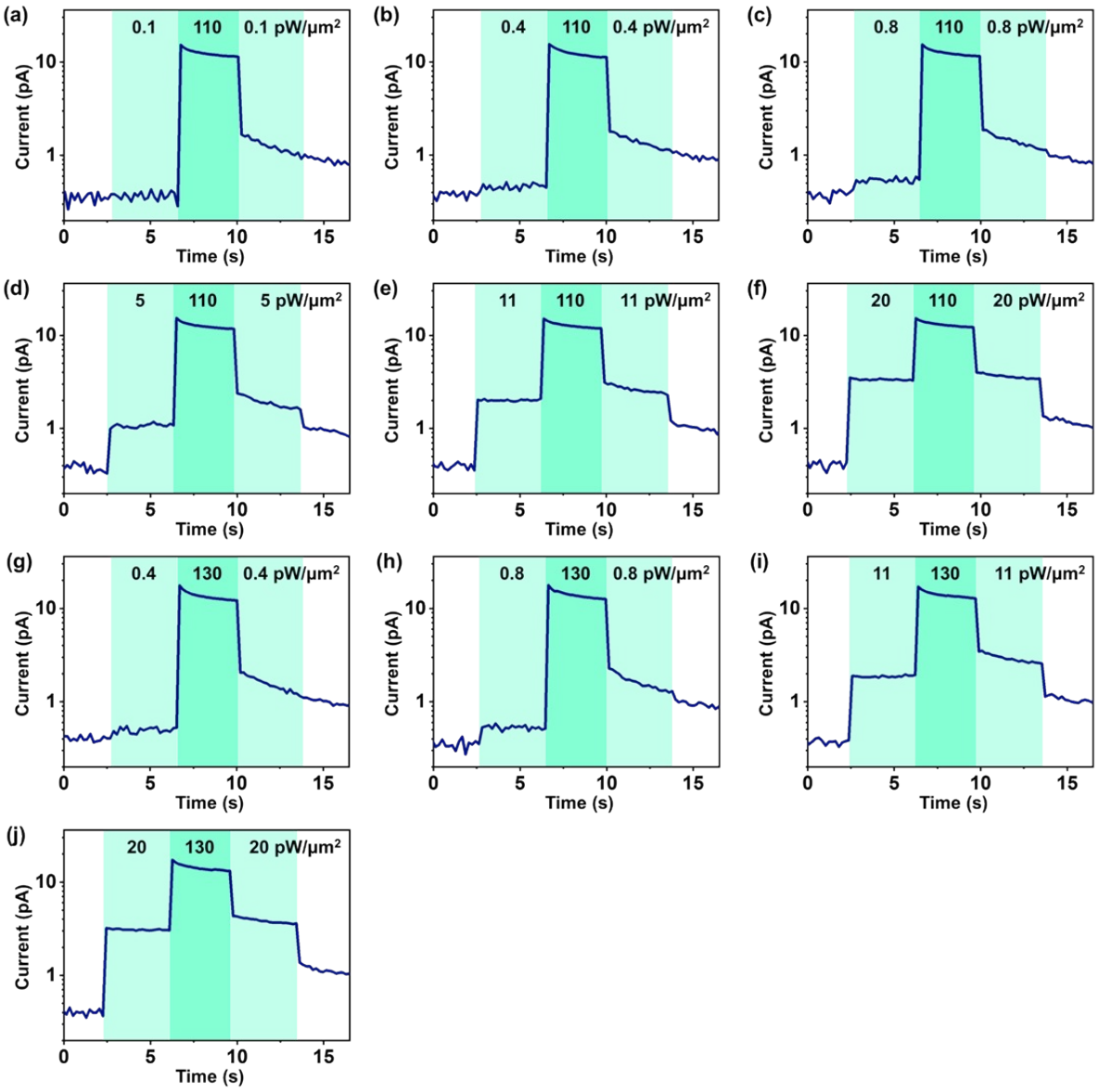

Fig. S7. Photocurrent response of the device under different read voltages of (a) 0.2 V, (b) –0.1 V, and (c) –0.2 V. Light color, green; pluse width, 3.6 s; light intensity, 0.5 to 11 pW/μm^2.