

SUPPORTING INFORMATION

Epitaxial growth of vertically aligned ZnO nanowires for bidirectional direct-current driven light-emitting diodes applications

Zhi-Feng Shi, Yuan-Tao Zhang,* Xi-Jun Cui, Shi-Wei Zhuang, Bin Wu, Jun-Yan Jiang, Xian-Wei Chu, Xin Dong, Bao-Lin Zhang,* Guo-Tong Du

¹State Key Laboratory on Integrated Optoelectronics, College of Electronic Science and Engineering, Jilin University, Qianjin Street 2699, Changchun 130012, People's Republic of China

a) Author to whom correspondence should be addressed. Electronic mail: zhangyt@jlu.edu.cn, zbl@jlu.edu.cn

Table S1. Preparation conditions of four samples

Sample	Stage I			Stage II			
	No.	T (°C)	t (s)	P (Pa)	T (°C)	t (min)	P (Pa)
S1	–	–	–	750	30	77	0 ^a
S2	570	30	77	750	30	77	0
S3	570	30	77	750	30	1600	0
S4	570	30	77	750	30	1600	3000

^aLI is short for light irradiation intensity.

Generation mechanisms of electrons in reverse-biased mode

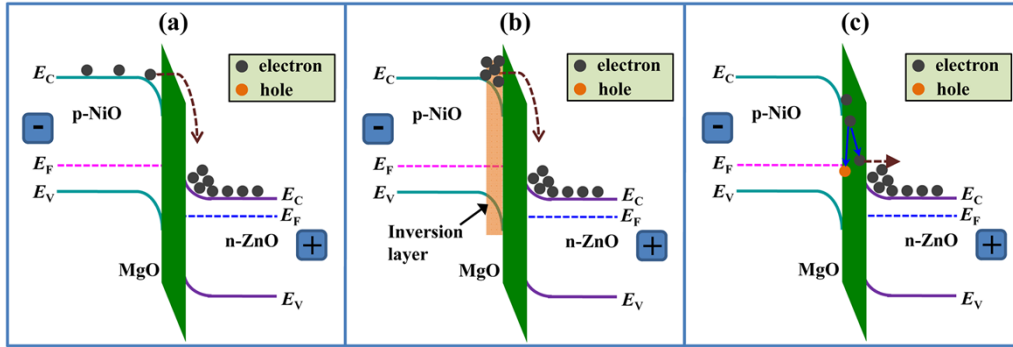


FIG. S1. (a) Electrons injected from the conduction band of p-NiO to that of ZnO. (b) Electrons injected from an inversion layer of electrons formed at NiO/MgO interface. (c) Generation of electron-hole pairs through the impact ionization process.

Generation mechanisms of holes in reverse-biased mode

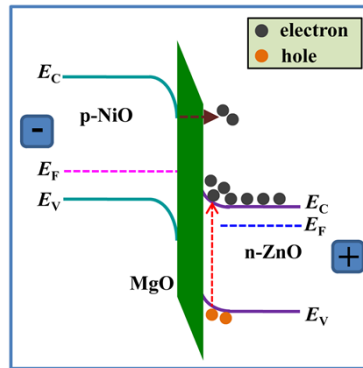


FIG. S2. Generation of electrons and holes in n-ZnO layer by accelerated electrons.