



US011001497B2

(12) **United States Patent**
Li et al.

(10) **Patent No.:** **US 11,001,497 B2**
(45) **Date of Patent:** **May 11, 2021**

(54) **HIGH PERFORMANCE TOPOLOGICAL INSULATOR TRANSISTORS**

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(*) Notice: Subject to any disclaimer, the term of this patent is extended or adjusted under 35 U.S.C. 154(b) by 0 days.

(21) Appl. No.: **14/652,017**

(22) PCT Filed: **Dec. 12, 2013**

(86) PCT No.: **PCT/US2013/074773**
§ 371 (c)(1),
(2) Date: **Jun. 12, 2015**

(87) PCT Pub. No.: **WO2014/093681**
PCT Pub. Date: **Jun. 19, 2014**

(65) **Prior Publication Data**
US 2015/0333163 A1 Nov. 19, 2015

Related U.S. Application Data

(60) Provisional application No. 61/736,743, filed on Dec. 13, 2012, provisional application No. 61/745,565, (Continued)

(51) **Int. Cl.**
B82Y 10/00 (2011.01)
H01L 29/775 (2006.01)
(Continued)

(52) **U.S. Cl.**
CPC **B82Y 10/00** (2013.01); **H01L 29/0673** (2013.01); **H01L 29/66984** (2013.01);
(Continued)

(58) **Field of Classification Search**
CPC G01R 19/00; H01L 29/78609; H01L 29/78615
(Continued)

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(57) **ABSTRACT**

Topological insulators, such as single-crystal Bi₂Se₃ nanowires, can be used as the conduction channel in high-performance transistors, a basic circuit building block. Such transistors exhibit current-voltage characteristics superior to semiconductor nanowire transistors, including sharp turn-on, nearly zero cutoff current, very large On/Off current ratio, and well-saturated output current. The metallic electron transport at the surface with good effective mobility can be effectively separated from the conduction of the bulk topological insulator and adjusted by field effect at a small gate voltage. Topological insulators, such as Bi₂Se₃, also have a magneto-electric effect that causes transistor threshold voltage shifts with external magnetic field. These prop-

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