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Scanning Tunneling Microscopy Study of Atomic and Electronic Structures of PbTaSe2 TIEN-MING CHUANG, Institute of Physics, Academia Sinica, Taipei 11529, Taiwan, SYU-YOU GUAN, Institute of Physics, National Taiwan University, Taipei 10617, Taiwan, PENG-JEN CHEN, Department of Physics, National Tsing Hua University, Hsinchu 30013, Taiwan, TAY-RONG CHANG, Department of Physics,Princeton University, Princeton, NJ 08544, USA, RAMAN SANKAR, FANG-CHENG CHOU, Center for Condensed Matter Sciences,National Taiwan University, Taipei 10617, Taiwan, HORNG-TAY JENG, Department of Physics, National Tsing Hua University, Hsinchu 30013, Taiwan, CHIA-SENG CHANG, Institute of Physics, Academia Sinica, Taipei 11529, Taiwan — The noncentrosymmetric PbTaSe2 becomes superconducting at Tc = 3.7K and is proposed to have a 3D massive Dirac fermions by large spin orbital coupling. The observation of topological nodal line states has been reported by recent ARPES measurements, making this material a great candidate to investigate the coupling between topological states and superconductivity. Here we conduct detail studies on cleaved PbTaSe2 surfaces by spectroscopic imaging-scanning tunneling microscope. Our results reveal several types of cleaved surfaces, within which each exhibits distinct different LDOS from scanning tunneling spectroscopy measurements. We identify different surface terminations from their atomic structures and their corresponding electronic properties both above and below Tc. We will report the impact on superconducting properties of different surfaces, and also discuss the relation between the surface state and superconductivity.

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