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Atomic structures of B20 FeGe thin films grown on the Si(111) surface WONDONG KIM, Korea Research Institute of Standards and Science/University of Science and Technology, SEUNGKYUN NOH, University of Science and Technology, JISOO YOON, Sookmyoung Women's University, YOUNG HEON KIM, INHO LEE, Korea Research Institute of Standards and Science/University of Science and Technology, JAE-SUNG KIM, Sookmyoung Women's University, CHANYONG HWANG, Korea Research Institute of Standards and Science — We investigated the growth and atomic structures of FeGe thin films on the Si (111) surface by using scanning tunneling microscopy (STM) and transmission electron microscopy (TEM). The 2 ˜5nm- thick FeGe thin films were prepared on the clean Si(111) 7x7 surface by co-deposition of Fe and Ge from separated electron-beam evaporators. With direct deposition on the substrate at the temperature above 550 K, the surface of FeGe films was not smooth and consisted of coarse grains. By the combination of room-temperature annealing and post-annealing process around 800 K, the structure of FeGe thin films evolved into the well crystalized structures. Atom-resolved STM images revealed that there are at least four different surface terminations. We constructed atomic models for each surface terminations based on the bulk atomic arrangement of a B20 chiral structure and confirmed that the observed STM images are successfully reproduced by using computational simulations employing Vienna Ab Initio Simulation package (VASP) with a B20 chiral structure model. TEM cross-sectional images also support our atomic models by revealing clearly the characteristic zigzag features of B20 structures of FeGe(111) thin films.

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