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Visualization of Ce atoms and surface-induced magnetism in $CeCoIn_5$ YASUO YOSHIDA, HOWON KIM, The institute for solid state physics, The University of Tokyo, CHI-CHENG LEE, HSIN LIN, Graphene Research Centre, National University of Singapore, YOSHINORI HAGA, NAOYUKI TATEIWA, Advanced Science Research Center, Japan Atomic Energy Agency, ZACHARY FISK, Department of Physics and Astronomy, University of California, Irvine, YUKIO HASEGAWA, The institute for solid state physics, The University of Tokyo — $CeCoIn_5$ is known as a heavy fermion compound naturally born at the quantum critical point having an unconventional d-wave superconducting phase at low temperatures. Recently, several STM works on a cleaved surface of this compound reported visualization of emerging heavy fermion bands and consistency of the bulk superconducting properties reported previously. However, reported STM images in those works only visualized In atoms on the Ce-In plane even though the Ce-In plane contains Ce and In atoms. By performing precise low-temperature STM measurements on $CeCoIn_5$, we successfully visualize Ce atoms on the Ce-In plane and, in addition, surface-induced staggered dumbblell-shaped order on the Co plane. This ordered structure locally has C_{2v} symmetry but retaining C_4 symmetry. This structure coexists with the superconductivity, and is robust against temperatures ($>T_c$) and an external magnetic field ($>H_{c2}$). In the talk, we will discuss the origin of the peculiar ordered structure based on our experimental observations together with first principles calculations.

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