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Atomic-scale spatial modulation of zero-bias conductance in $CeCoIn_5$[1] YASUO YOSHIDA, HOWON KIM, YASUHIRO TADA, YUKIO HASEGAWA, Univ of Tokyo-Kashiwanoha, MICHI-TO SUZUKI, Riken, YOSHINORI HAGA, NAOYUKI TATEIWA, Japan Atomic Energy Agency, ZACHARY FISK, University of California, Irvine — Understanding the pairing mechanism of unconventional superconductivity has been a long-standing problem in condensed matter physics. Scanning tunneling microscopy (STM) has been utilized to pursue the pairing mechanism especially on high-T_C cuprates and recently on the heavy fermion superconductor $CeCoIn_5$. However, the observed superconducting gap spectrum on $CeCoIn_5$ contains unexpectedly large zero-bias conductance (ZBC) even well below the critical temperature. By performing precise low-temperature STM measurements, we found that the amount of ZBC is larger on In sites and smaller on Ce sites in CeIn planes. We interpret this atomic-scale modulation as a consequence of different hybridization strengths of Ce $5d$ and In $4p$ bands with Ce $4f$ band, indicating that both the unexpected ZBC and the spatial modulation are attributed to the fact that Ce $4f$ electrons indeed play a main role for the superconductivity.

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