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STM/STS study of superconducting properties in $Ca_{10}(Pt_4As_8)(Fe_2As_2)_5$[1] JISUN KIM, Department of Physics and Astronomy, Louisiana State University, Baton Rouge, HYOUNGDO NAM, Department of Physics, The University of Texas, Austin, GUORONG LI, AMAR KARKI, Department of Physics and Astronomy, Louisiana State University, Baton Rouge, CHIH-KANG SHIH, Department of Physics, The University of Texas, Austin, JIANDI ZHANG, RONGYING JIN, E.W. PLUMMER, Department of Physics and Astronomy, Louisiana State University, Baton Rouge — Newly discovered iron-based superconductor, $Ca_{10}(Pt_4As_8)(Fe_2As_2)_5$ (T_c = 34 K) is studied using scanning tunneling microscopy/spectroscopy (STM/S). Given the symmetry of the crystal structure, several surface terminations are expected with roughly same probability: 1) Ca or partial Ca layer on top Fe_2As_2; 2) Ca or partial Ca layer on top Pt_4As_8 layer; 3) A Fe_2As_2 layer, and; 4) A Pt_4As_8 layer. Surprisingly, Fe_2As_2 related layers (1 & 3) are rarely observed (less than 1%). Instead, we observe Pt_4As_8 layers separated by unit-cell-high ($\sim$ 1 nm) steps accompanied with Ca or partial Ca layer on top Pt_4As_8 layer (1 - 2 Å step height). Scanning tunneling spectroscopy reveals different spectra for each surface, with superconducting coherence peaks seen only on Ca layers. We argue that intermediary layers are proximity-coupled to superconducting Fe_2As_2 layers. The results from $Ca_{10}(Pt_4As_8)(Fe_2As_2)_5$ are discussed with the properties observed in other iron-based superconductors.

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