## Abstract Submitted for the MAR14 Meeting of The American Physical Society

Possible Superconductivity in the 2-Dimensional Electride Ca<sub>2</sub>N JEONGHOON HA, Center for Nanoscale Science and Technology, NIST / Maryland NanoCenter, Univ. of Maryland, HONGWOO BAEK, CNST, NIST / Dept. of Phys. and Astro., Seoul Nat'l Univ., DUMING ZHANG, CNST, NIST / Maryland NanoCenter, Univ. of Maryland, YEJI KIM, SUNGWNG KIM, Dept. of Energy Science, Sungkyunkwan Univ., YOUNG JAE SONG, SAINT and Dept. of Phys., Sungkyunkwan Univ., YOUNG KUK, Dept. of Phys. and Astro., Seoul Nat'l Univ., FRED SHARIFI, JOSEPH A. STROSCIO, CNST, NIST — An electride is an ionic compound in which electrons take the place of negative charged ions and the topology of the cavities confining these anionic electrons determines the physical properties of the material. A recent study reported  $Ca_2N$  to have a layered structure with anionic electrons confined to 2-D cavities between the cationic crystal layers. Magneto-resistance measurements confirmed diffusive 2-D transport in electron layers. In the present work, we use an ultra-low temperature STM to investigate the local electronic structure of a cleaved surface of a  $Ca_2N$  crystal. A small energy gap was observed in the tunneling spectrum with a main gap of 0.4 meV. The spectra contain multiple coherence-like peaks suggestive of possible multi-junction superconductivity. Temperature-dependent measurements show a gradual reduction of the gap up to 2 K, but the gap is not suppressed in the presence of a perpendicular magnetic field up to 14.5T, suggesting that if the material is superconducting, then the upper critical field is extremely large compared to the transition temperatue. This can be understood in the context of recent reports on unconventional superconductivity of chalcogenide compounds.

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