Superconductivity of nano-size Pb Islands studied by low-temperature scanning tunneling microscopy / spectroscopy

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In this study we investigated superconductivity inside superconductors by directly measuring the superconducting gaps over ultra thin Pb island structures using a LT-STM at 2.0 K [1]. The obtained tunneling spectra exhibit an increment of zero bias conductance (ZBC) with a magnetic field and its dependence on the lateral size of the islands. Moreover, from spatial mappings of ZBC, the island size dependence and spatial variation of superconductivity inside of each island are visualized. We found that the number of vortices piercing the islands before breakdown of superconductivity depends on the lateral size of the islands. Details of the size-dependent critical fields are discussed at the presentation. [1] Nishio et al., APL 88, 113115 ’06, JJAP 46, L880 ’07.

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