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Vortex excitation in nano-sized Pb island structures using low temperature scanning tunneling microscopy TAKAHIRO NISHIO, ISSP, Univ. Tokyo, SHIZENG LIN, WPI-MANA, NIMS, KOUSUKE MIYACHI, TOSHU AN, TOYOAKI EGUCHI, YUKIO HASEGAWA, ISSP, Univ. Tokyo — Vortex behaviors in nano-size superconductors have attracted a lot of attention since there are various novel phenomena due to the size and shape effects. Using scanning tunneling microscopy/spectroscopy (STM/S) at low temperature (<2 K) we have visualized vortex phases on atomically-flat nano-sized Pb islands formed on the Si(111)-7x7 substrate and measured the critical magnetic fields for vortex penetration and expulsion [1]. In this study we demonstrate the excitation of a vortex with additional pulsed tunneling current from an STM probe tip. We found that probability of the excitation depends on the amount of the tunneling current, the pulse duration and a tip position in the island. These dependences suggest that the formation of normal state region below the tip due to the excess tunneling current induces the vortex penetration. Experimental details and theoretical results will be explained in the presentation. [1] T. Nishio *et al.*, PRL **101**, 167001(2008).

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