

Present Status of the Slow Positron Facility of Institute of Materials Structure Science, KEK

I. Mochizuki¹, K. Wada², Y. Fukaya³, T. Shirasawa⁴, Y. Endo⁵, A. Takayama⁶,
S. Hasegawa⁵, A. Ichimiya¹, Y. Nagashima^{1,7}, M. Maekawa², A. Kawasuso²,
A. Ishida⁷, N. Toge⁸, K. Furukawa⁸, Y. Nagai^{1,9}, T. Hyodo^{1*}

¹*Institute of Materials Structure Science, KEK, Tsukuba, 305-0003, Japan*

²*Takasaki Advanced Radiation Research Institute, QST, Takasaki, 370-1292, Japan*

³*Advanced Science Research Center, JAEA, Tokai, 319-1195, Japan*

⁴*National Metrology Institute of Japan. AIST, Tsukuba, 305-8565, Japan*

⁵*Department of Physics, School of Science, The University of Tokyo, Tokyo, 113-0033, Japan*

⁶*School of Advanced Science and Engineering, Waseda University, Tokyo, 169-8555, Japan*

⁷*Department of Physics, Tokyo University of Science, Tokyo, 162-8601, Japan*

⁸*Accelerator Laboratory, KEK, Tsukuba, 305-0003, Japan*

⁹*Intern. Res. Center Nucl. Mater. Sci., IMR, Tohoku University, Oarai, 311-1313, Japan*

Recent results of the experiments at SPF at IMSS, KEK are reported.

At the total-reflection high-energy positron diffraction (TRHEPD[1,2]) station on the branch SPF-A3, the structure of germanene on Al(111) surface was determined to be different from that previously reported [3]. The structure of Ca-intercalated bilayer graphene is also determined to be different from that previously proposed [4]. Azimuthal analysis, proposed for RHEED [5] before, is being developed, where the azimuthal angle dependence of the spot intensity is analyzed with the glancing angle fixed.

On the branch SPF-A4, The first version of the LEPD (low energy positron diffraction) station was completed, and the incident energy dependence of the LEPD pattern on the Ge (001)-c (4×2) surface was measured [6]. The station is being further improved to make an electrostatic lens 2.5 times longer in order to reduce the background due to the annihilation γ rays from the remoderator, and to implement a hexanode DLD detector.

At the general-purpose station on the branch SPF-B1, experiments of laser cooling of positronium (Ps) as a first step of the realization of Ps Bose-Einstein condensate started. The beam line was modified and the chamber for the positronium negative ion (Ps^-) was replaced with one for the new experiments.

At the positronium time-of-flight (Ps-TOF) station on the branch SPF-B2, temperature dependence of positronium formation at Si(111) and Si(001) surfaces has been investigated by changing the doping levels systematically over the temperature range of 300–1000 K[7]. The Ps-TOF spectra show a component of Ps formed through the work-function mechanism and one through the surface-positron-mediated process.

References

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*Corresponding author, Email: hyodot@post.kek.jp

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