Spin-resolved Photoelectron Spectroscopy at HiSOR ~Present Status and Future Prospect~

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Our developed spin- and angle-resolved photoemission apparatus (SARPES) equipped with two high-efficiency VLEED-type spin detectors is installed at the branch beamline BL-9B of the APPLE-II undulator in 2013[1]. The double highly efficient spin detector is installed in a 90-degree configuration to enable direct observation of three-dimensional spin orientation. Up to now, through joint research and our own research, we have clarified the peculiar spin-dependent electronic structure of various materials (topological materials, Rashba materials, and magnetic materials etc.) using our SARPES and elucidated the properties of materials from their electronic structure.

Recently, three new improvements were done in our apparatus at BL-9B. Firstly, a elliptical focusing mirror is installed, to improve the large beam size (3000(H)x500(V) μm). As a consequent, the beam size has been reduced to 500(H)x100(V) μm, i.e., one-sixth smaller than previous one. Secondly, the two slits and diffraction gratings in our beamline, which were operated manually, can now be changed automatically by installing a stepping motor. This has transformed the system into a more user-friendly one. Thirdly, toward the operando measurement, we developed the manipulator with eight electrodes that can contact the electrodes on a special sample holder.

In this presentation, we will briefly report on the current status of SARPES at BL-9B and the obtained experimental results for the period 2018-2023. In addition to the BL-9B instrument, we will also report on the status of the μ-laser-SARPES instrument that was recently successfully developed[2]. Future prospects for these instruments will also be presented.

REFERENCES

1. T. Okuda et al., *J. Electron. Spectrosc. Relat. Phenom.* **201**, 53-59 (2015).
2. T. Iwata, *Sci. Rep.* **14**, 127 (2024).