Performance of the spin- and angle-resolved photoemission spectrometer with highly efficient VLEED spin detector

K. MIYAMOTO, T. OKUDA, A. KIMURA, H. MIYAHARA, K. KURODA, H. NAMATAME, M. TANIGUCHI, Hiroshima univ. — Because of the growing scientific interests in the spin-related exotic materials such as topological insulators, spin- and angle-resolved photoemission with much improved efficiency is strongly desired. In this report, we present the current status of a new SARPES with significantly improved energy- (\(\Delta E\)) and angular resolutions (\(\Delta \theta\)), which is under construction at beam line BL-9B in Hiroshima Synchrotron Radiation Center. The system consists of high performance hemispherical analyzer (VG-Scienta R-4000) and highly efficient spin detector based on very low energy electron diffraction of Fe(001)p(1x1)-O, which has 100 times higher efficiency than conventional Mott spin detector. Owing to the high efficiency of the detector, the highest \(\Delta E\) and \(\Delta \theta\) have been improved to be 7.5 meV and 0.37°. Moreover, high-resolution ARPES measurement (\(\Delta E \sim 2\) meV, \(\Delta \theta \sim 0.2^\circ\)) and Fermi surface mapping in the sample temperature range from 8K to room temperature can be efficiently performed by hemispherical analyzer equipped with multi-channel detector and motorized 5 axis goniometer. These features of the SARPES enable us to observe detailed spin-dependent band structures of topological insulators very precisely and efficiently.

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