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Development of the pixel detector for the ΔE -E telescope system at the HIRFL-CSR

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The ΔE -E telescope system at the HIRFL-CSR External Target Facility is proposed to study the reaction mechanism and unique structure of weakly bound nuclear in elastic scattering and burst reaction experiment. The silicon pixel detector is one of the major sub-detectors in this telescope system. In order to fulfill the requirements of spatial resolution, energy resolution, linear range and response time, the 10mm x 10mm square silicon has been chosen as the pixels. Each detector pad is packaged with 10x10 square silicon pixels with the process of planar technology on microelectronics manufacture line. Together with the detector pads, a dedicated electronics system has also been designed to realize the readout functionalities. In this paper, the design, manufacture and first performance results of the silicon pixel detector will be discussed. The reverse leakage currents of each pixels are measured to less than 60 nA at full depleted voltage and the energy resolution of each pixels is calculated to be 1.1%.

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