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Development of large area pixel array sensors for STARLIGHT

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TARLIGHT (SemiconducTor Array detectoR with Large dynamIc ranGe and cHarge inTegrating readout) is the pixel array detector developed for SHINE (Shanghai HIgh repetitioN rate XFEL and Extreme light facility), which is a hard XFEL facility with high repetition rate up to 1MHz at Shanghai. The detector is modular designed with each module consisting of a 10.5mm×2.77mm sensor bump bonded to 2×8 readout ASICs. The pixels are laid out on a 99μm pitch and 128×128 array per ASIC. Consequently, one module has 256k pixels. We fabricated a pixelated silicon sensor on a 500 μm-thick, high resistivity (> 5 kΩ·cm) n-type and double-sided polished 8-inch silicon wafer at the Institute of Microelectronics of the Chinese Academy of Sciences (IMECAS). To produce this large area sensor, advanced stitching process was employed. The electrical characterizations of the sensors have been investigated. The drain currents of the CCR (Current Collected Ring) is 100nA @ 200V and the breakdown voltage exceeds 300V. In future we plan to organize TCT measurements and study the effects of radiation damages.

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