THE STRUCTURE CHANGE AND ELECTRICAL CHARACTERISTICS WITH VARIED ANNEALING CONDITION OF AMORPHOUS SILICON/THIN SILICON OXIDE/CRYSTALLINE SILICON STRUCTURE

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Carrier selective contact with low carrier recombination and effective carrier transport is necessary to minimize recombination at the metal/silicon interface for high conversion efficiency for silicon solar cells. The carrier selective contact consists of a ~1.5 nm thick thin oxide and a phosphorus doped polysilicon (poly-Si) thin film. Poly-Si formed by subsequent thermal crystallization of amorphous silicon (a-Si). We studied the changes in a-Si/thin oxide/c-Si structure with various annealing temperature and time. At annealing temperature of 800 °C, crystallization occurs in short time annealing and result in electric field formation. At annealing temperature of 800, 900 and 1000 °C, crystalline volume fraction and crystalline size increase with increasing the annealing temperature. We used quasi-steady-state photoconductance (QSSPC) measurement and spectroscopic ellipsometer (SE) to analyze electrical properties of a-Si with various annealing temperature and time. Also, structural change of a-Si/thin oxide/c-Si was analyzed by SE and its modeling.