



# Interface properties of amorphous/crystalline silicon heterojunctions: Modeling, experiments and solar cells

*Sara Olibet*

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Solar cells based on monocrystalline silicon (c-Si) can potentially achieve high sunlight energy conversion efficiencies and thus could reach grid parity despite the high cost of c-Si. The efficiency of standard c-Si solar cells featuring diffused emitters and aluminum back surface fields (BSF) is limited by interface recombination. Alternatively the growth of intrinsic/doped amorphous silicon (a-Si:H) layer stacks on c-Si effectively passivates the c-Si surface and simultaneously forms the emitter and BSF. Such Si heterojunction (HJ) solar cells can use thin c-Si wafers, benefit from low production cost of a-Si:H layers and enable the highest efficiencies. The focus of this work is the study of interfaces in a-Si:H/c-Si heterostructures, particularly the electronic quality of the a-Si:H/c-Si heterointerface and its effect on the subsequent a-Si:H/c-Si HJ solar cell fabrication. Interface recombination modeling by considering the amphoteric nature of Si dangling bonds is in excellent agreement with measurements, and provides insight into the microscopic passivation mechanisms.

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