ABSTRACT
Top-down Aluminum Induced Crystallization (TAIC) of amorphous silicon (a-Si) may potentially be used to simulate the formation of planar nanocrystallites on the silicon surface. Film thicknesses below the silicon layer will be quantified in order to develop an understand of the observed enhancement. Computer simulations using Ansys HFSS are being used. The electric fields absorbed inside the silicon are obtained as a function of the incident wavelength due to quantize nanocrystallites of amorphous packets to simulate the reduced aluminum-silicon packets.

MOTIVATION
Silicon solar cells inevitably suffer from poor light absorption, especially at longer wavelengths near the bandgap energy. With the bulk of the cost of a solar cell being the silicon material itself, there is a desire to develop thin-film silicon cells with comparable performance to traditional solar based cells. However, a major issue thin-film race is that light absorption is worse than with bulk cells. For thin-film silicon cells to be competitive, effective methods of trapping and concentrating of light near the thin-film surface must be developed. It has been shown that planar nanocrystallites located on the solar cell surface can effectively increase light absorption in thin silicon layers. While several methods have been demonstrated to cause nanocrystallites to occur during the process of Top-down Aluminum Induced Crystallization (TAIC) of amorphous silicon (a-Si), specifically, to quantify possible enhancement of the electromagnetic energy within the silicon.

REFERENCES

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FUTURE WORK
In order to better understand the effects of these structures, additional modeling must be performed. Only one polarization was considered in this work, so a second polarization perpendicular to the plane of the patch would provide insight to the complete behavior of the structure. Further improvements can be made to provide a more accurate model, including addition of relaxation effects, variance of the spacing between patches and non-thermal incident excitations. Additional considerations on the possibility of this method to be used for actually cell are currently being evaluated.