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Simulation of Amorphous Silicon Thin Film Transistors WILLIAM SCHENKEN, IDEMUDIA AIRUOYO, REUBEN COLLINS, Physics Department at Colorado School of Mines — Amorphous and crystalline silicon are some of the most commonly used materials in modern solar cells and microelectronic devices due to silicon's abundance, low cost, and device performance. Thin film transistors (TFTs) using amorphous silicon and related materials represent an important class of silicon-based devices. Accurate modeling and simulation of amorphous silicon TFTs allows for more effective and efficient ways of optimizing adjustable parameters and extracting useful information not easily obtainable through experimentation. Using material parameters previously developed to accurately simulate amorphous silicon solar cells, this study presents finite element analysis of amorphous silicon TFTs and a comparison to experimental results. The simulations are used to guide understanding of the effect of defect structure on device metrics. The intensity dependent photoresponse of the TFTs is also explored to assist in extracting defect structure from experimental results. The use of simulation in interpreting experimental results is found to improve understanding and minimize the time required to optimize devices.

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