Polycrystalline silicon thin films are used in a wide array of electronic applications such as integrated circuits, displays, and solar cells. Such films are typically manufactured by heating amorphous silicon films with a pulsed excimer laser to induce crystallization by annealing. This technology is an improvement to the excimer laser annealing (ELA) process for production of high-quality polycrystalline silicon thin films. It employs an advanced ELA (AELA) system to control the shape and melt profile of film regions to promote desirable crystal growth by adjusting the shape of the laser beam used to irradiate the film.

High throughput, low cost system produces large grains with highly uniform boundaries that do not impede charge mobility

The boundaries between crystal grains reduce charge carrier (electron) transport mobility and thereby increase the film’s electrical resistance. Increased control over the shape of the laser beam used to melt the film during annealing enables irradiation of regions with shapes that promote the growth of crystals with more directed grain boundaries. This microstructure results in improved charge mobility. With this technology, large grain polycrystalline films can be made in a single step for thin film transistors in consumer electronics.

Lead Inventor:

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Applications:

- High performance electronic displays
- High efficiency photovoltaic cells
- Integrated electronic circuits with reduced power requirements
Advantages:

- Improves performance of thin film electronics by increasing charge mobility and thereby reducing film resistance
- Reduces energy costs of fabricating large-grain thin films
- Increases energy efficiency of electronics that use thin films by reduction of film resistance
- High throughput and inexpensive

Patent information:

Patent Pending

Tech Ventures Reference: IR CU14157

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