

Electron beam melting with digital image processing in obtaining float-zone silicon rods - an advanced material for high-performance solar panels

Rihards Fuksis¹, Mihails Pudzs¹, Anatoly Kravtsov², Alexey Kravtsov²

¹Institute of Electronics and Computer Science, Latvia

² SIA “KEPP EU”, Latvia

e-mail: Rihards.Fuksis@edi.lv, Mihails.Pudzs@edi.lv, doc@keppeu.lv, alexey@keppeu.lv

Solar panels are rapidly becoming part of our daily life. Float zone (FZ) silicon (Si) is an advanced material with more perfect crystalline structure than other types of crystalline Si, yielding in higher efficiency photovoltaic (PV) cells. We present a work-in-progress for a new approach for competitive production of silicon rods – a feedstock for said advanced material, by using electron beam heating, digital image processing and automatic maintenance of rod diameter [1].

Experimental setup consists of melting and pulling chamber, with a flap gate valve in between, two electron beam guns and pulling drive. Growing procedure is conducted with use of a seed crystal, which is rotated and pulled upwards from the melt.

Growth control was employed with PID regulation combined with digital image processing. Image processing software based on line extraction non-halo complex matched filtering approach [2] was developed in order to extract the details of the

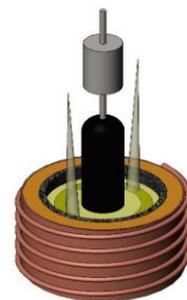


Fig.1 Experimental setup



Fig.2 Rods grown without (a) and with (b) stabilization

has significantly increased from $\pm 40\text{mm}$ to $\pm 4\text{mm}$ (Fig.2).

References

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