

IW0002

High efficiency CIGS solar cells on stainless steel by magnetron sputtering

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Midsummer has by adopting production technology from the optical disc industry (CD and DVD) developed a high speed CIGS process by utilising magnetron sputtering in all processing steps. The solar cells are made on stainless steel substrates, stamped out from 0.3 mm thick ordinary ferritic stainless steel. To show the potential of the technology, 1 cm² Cd-free CIGS solar cells with 15.8% active area efficiency have been made. The technology is well suited for high volume production of thin film CIGS solar cells.

We have opted to use the well developed production technology from the optical disc industry in order to make individual cells (as opposed to modules) at a high pace. The complete solar cell structure is made by sputtering without breaking vacuum. Sputtering of high efficiency CIGS solar cells has already been presented by other actors. Midsummer has developed a tool which makes a complete Cd-free CIGS solar cell structure at cycle times below 20 s and with process temperatures up to 700°C. The tool is offered to customers as the central part of a turn key line for production of CIGS solar cells as well as a smaller flexible tool for researchers.

The Midsummer CIGS technology has been developed in house for the last 6 years. Production technology from the Optical Disc industry has been utilised in order to make thin film CIGS cells at a high pace. The process has been developed on used CD-RW equipment with a limited number of process chambers. The DUO tool does not have the same limitation since it is equipped with 25 cathodes to avoid bottlenecks in production.

Keywords

CIGS

magnetron

sputtering