

Proposal

High Voltage matrix solar modules

Developer: Russian Scientific
Research Institute of Electrification

Objective

Solar market looking for new technology

- Increase performance of solar cells
- Increase life cycle of solar modules
- Cost reduction of solar plants
- Ability to compete with Chinese companies



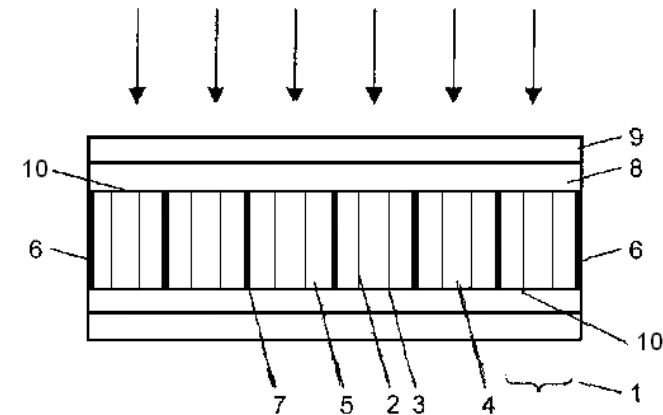
High Voltage matrix solar modules

Our technology

- The module has a double-sided operating surface and produced in a matrix of series connected miniature solar cells
- Illuminating surfaces solar modules divided into area of charge carriers generation and area with p-n junction responsible for the separation and collection of charge carriers

Results achieved

- Voltage up to 840 V
- Performance = 14,58 % (solar radiation = 1 kW/m²)
- Performance = 24 % (solar radiation = 102 kW/m² with concentrating)
- Life cycle is 40 years



- 1 – solar modules
- 2 – p-n junction
- 3 – isotopic junction
- 4 – base region n-type
- 5 – isotope doped p+ layer
- 6 – external metallic contacts
- 7 – internal metallic contacts
- 8 – passive layer
- 9 – antireflection coating
- 10 – operating surface

Comparison

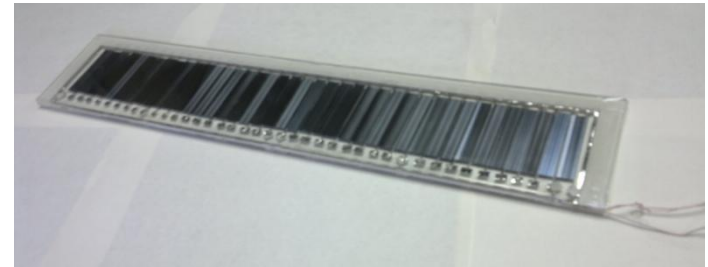
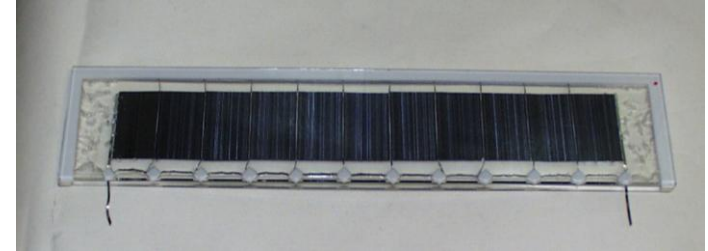
Comparison with planar solar module

Parameter	High voltage matrix solar module	Planar solar module
Voltage, V	800	12 – 24
Life cycle, years	40 – 50	20 – 25
Average performance, % - solar radiation = 1 kW/m ² - spectrum AM 1,5 - temperature = 25 C ⁰	12 – 15	15 – 18
Performance with concentrating - solar radiation = 100 kW/m ² - spectrum AM 1,5 - temperature = 25 C ⁰	19 – 24	15 – 18

Advantages

Technology advantages

- High performance (19 – 24 %) at concentrated solar radiation
- Operating voltage (800 V)
- Life cycle is 40 years
- 10 times reduction of area under solar plant, saving of Si
- No transformers and converters on solar power plant (30% cost reduction)
- Low cost for installed capacity



Usage scenarios

Solar power plant with concentration

Advantages:

- High efficiency
- Low costs
- Green planet



Commercialization steps

Research and development step

- 1) We are looking for co-investors to finish our R&D project
 - Cost: **64,7 million RUB**
 - Duration: **36 month**

Production step

- 1) Small series production will be opened
- 2) Production expansion

Developer

The State Scientific Institution “All-Russian Scientific-Research Institute for Electrification of Agriculture” at the Russian Academy of Agricultural Sciences (GNU VIESH) is a **research center for energy supply, electrification** and automatization of agriculture, electromechanization of animal breeding and **use of renewable and nonconventional energy sources.**

The Institute was set up in March, 1930.

The Institute has 279 highly qualified specialists, including 24 doctors and 79 candidates of sciences, have **production capacity for high-quality and timely execution.**