

Proposal

Without chlorine technology
of solar silicon production
by plasma method

Developer: Russian Scientific
Research Institute of Electrification

Technology of solar silicon production

Our technology

- Technology protected by patents
- Quality 99,999%
- High-temperature plasma processing of silicon-containing materials
- $\text{SiO}_2 + \text{C} \rightarrow \text{Si} + \text{CO}_2$
- Low cost for production
- Clean production



Results achieved

- Implemented several pilot projects for various customers

Comparison

Comparison with competitors

Company	Prime cost, \$ /kg
Hemlock	27
Wacker	25
REC	26
MEMC	25 - 28
China companies	17
Our technology	15 *

Prime cost calculation:

- Quartzite 2,5 kg = 5 \$
- Pyrolytic carbon 1 kg = 4 \$
- Energy 15 kW/h = 3 \$
- Other costs = 3 \$

Total prime cost = up to 15 \$

* - Production of more than 100 tones per year

Advantages

Technology advantages

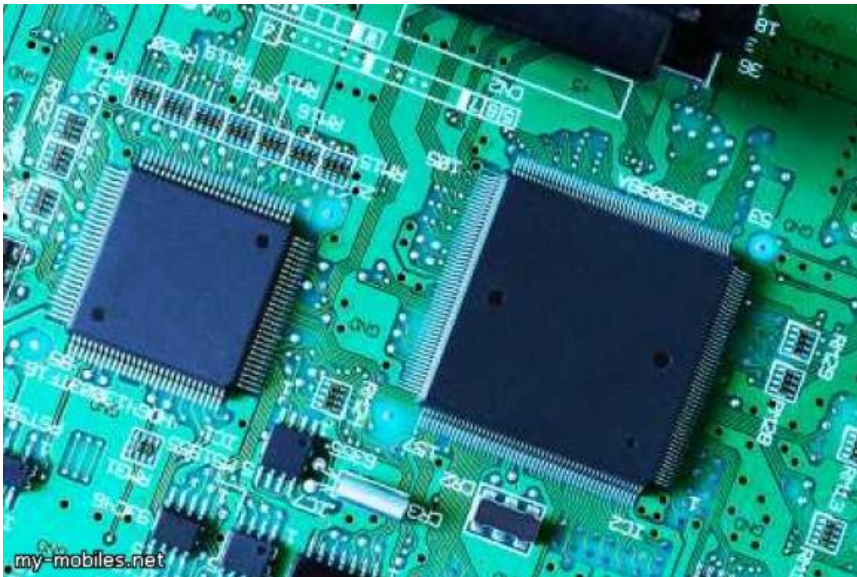
- Low cost for production
- Cost reduction for equipment service
- Cost reduction for construction of production
- High efficiency of technology process
- Possibility to produce more clear product
- Reduction of labor costs
- Waste reduction
- No chlorine utilization, clean production

Prime cost of silicon = 15 \$/kg

Usage scenarios

Solar systems -

- Semiconductor Industry



Commercialization steps

Research and development step

- 1) We are looking for co-investors to finish our R&D project
 - Cost: **35 million RUB**
 - Duration: **12 month**

Production step

- 1) Small series production will be opened (1000 tons per 1 year)
- 2) Production expansion