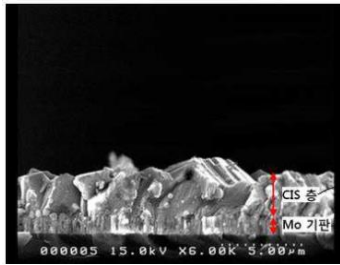




# APPARATUS FOR MANUFACTURING A SOLAR CELL SUBSTRATE WITH COLD SPRAYING AND METHOD FOR CONTROLLING THE SAME

**Affiliation :** Korea university      **Type of Partnership :** Open for negotiation      **Cost :** Open for negotiation  
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〈A thin film of solar cell layer〉

## Abstract

It is related to the manufacturing apparatus and control method of a inorganic thin film solar cell. Through the inorganic material powder of the micro size, it can form the high-efficiency minute solar cell layer and improve the production yield.

## Problems with Existing Technology

**Improving efficiency and production yield of a solar cell is needed.**

- The conventional method of forming solar cell layer needs lots of time and costs. Especially in the case of screen printing mode, it increases the shading loss and drops the efficiency of the solar cell.
- The conventional manufacturing process of CIGS thin film is difficult to enlarge and serious of contamination of the vacuum system inside.
- Due to lowering of photo conversion efficiency, the high-quality film fabrication is not facilitated to produce.

## Technology Readiness Level

TRL 4 : Technology validated in lab

TRL1	TRL2	TRL3	TRL4	TRL5	TRL6	TRL7	TRL8	TRL9
Basic Technology Research	Technology Concept formulated	Experimental Proof of Concept	Technology validated in lab	Technology validated in relevant environment	Technology demonstrated in relevant environment	System Prototype in operational environment	System complete & qualified	Full commercial application

## Differentiation and effect

### Differentiation

#### Low temperature spray type and spouting through multi-nozzle

- It makes the discharging of the inorganic material powder aerosol of the small size possible, even though it does not accompany the miniaturization of the expensive nozzle through the low temperature spray type.
- It make the simultaneous/optional injection through the multi-nozzle

#### Heating the substrate stage and excluding the carbon layer

- Through heating the substrate stage, it induces the elaborate deposition of the particle of the inorganic material powder and make the crystallization.
- Excluding the carbon layer by using precursor.

### Effect of Technology

#### Increasing efficiency of solar cell and maximizing the production yield

- The stable minute solar cell layer increases efficiency of the solar cell and reduces the manufacturing cost of the solar cell.
- It can increase the production yield through the simplification of the process.

#### Manufacturing a solar cell with the high-quality solar cell layer

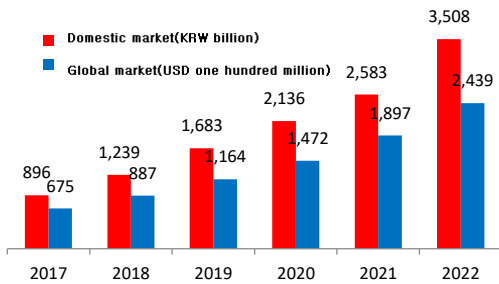
- Through adjusting of the composition rate of the organization of the solar cell layer, it makes the enlargement and maximizing the photo conversion efficiency.



### Technology Application Field

It can be applied for photovoltaics system using thin film solar cell.

### Market trends



Technical Analysis Report, niceinfo

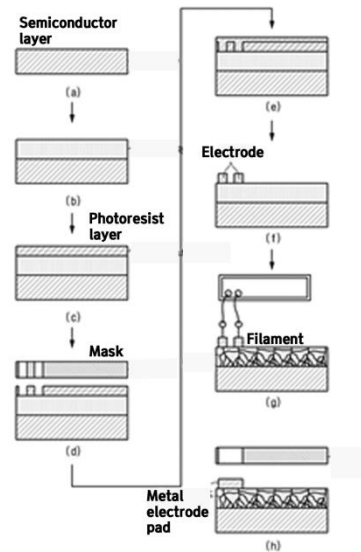
〈Photovoltaics system market〉

- The domestic photovoltaics system market reached KRW 896 billion in 2017 and is expected to reach KRW 3,508 billion in 2022, with an average annual growth rate of 29.7 percent.
- The global market of photovoltaics system reached USD 67.5 billion in 2017 and is expected to reach USD 243 billion in 2022, with an annual average growth rate of 28.8%.

### Technology Implementation

#### Manufacturing method of inorganic thin film solar cell

- Control unit applies the supply control signal to the inorganic material powder supply unit.
- Control unit applies the delivery control signal to the roll to roll unit.
- Evaporating the inorganic material powder in the solar cell board.
- Control unit applies the sensing control signal to sensing unit.
- Control unit adjust the nozzle velocity and transfer speed of the solar cell substrate using the sensing control signal of sensing unit and prior configuration data of storage unit.



〈Method of making the transparent electrode〉

### List of related patents

No.	Title of Invention	Patent No./ Application No.
1	APPARATUS FOR MANUFACTURING AN INORGANIC THIN-FILM SOLAR CELL, AND METHOD FOR CONTROLLING SAME	US 13/984,954
2	METHOD FOR MANUFACTURING TRANSPARENT ELECTRODE AND APPARATUS FOR MANUFACTURING TRANSPARENT ELECTRODE	PCT/KR2016/003218