

CuInSe₂-based Solar Cell Key Patent Analysis

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Abstracts

Photovoltaic energy is the one of the strategic key technology businesses that now the government are highly interested in and also high potential resource of renewable energies to be realized. PV industry is rapidly growing by annually over 40% for the last 2~3 years due to the boom of worldwide PV industry and becomes bright in the future.

The challenge of reducing manufacturing cost in PV industry makes chemical compound solar cell skyrocket recently. Within these solar cells, CIS-based solar cell has $1 \times 10^5 \text{ cm}^{-1}$ absorption coefficient that is highest number among semiconductors and 1~2 μm in thickness. Moreover, many researches are being conducted because of its high potential of high efficiency solar cell and high long-term electric-optical stability. CuInSe₂ compound semiconductor thin film solar cell developed by U.S based Boeing in 1980's is light weight space-use solar cell with high efficiency and high stability, made as replacement of mono-crystalline silicon solar cell (20W/kg). Moreover, generation per weight that is key constituent of space-use solar cell, is about 100W/kg, superior to 20~40W/kg of conventional Si or GaAs solar cell. Advanced countries have focused on technical development, aiming for land-based high efficient/low cost thin film solar cell since 1980s and achieved the highest conversion efficiency, 19.2%, of 1.2 eV single junction CuInGaSe₂ solar cells.

Solar&Energy considered the need for research and research ripple effect and choose CIS-based solar cell technology field (even detail technology) as the target for patent analysis. We searched patents from July 29, 1974 to Dec 31, 2010, targeting Korea from KIORIS DB, Japan from Thomson-innovation DB, U.S public/registered patents, EU public/registered patents and patents in other countries.

The contents of CIS-based solar cell are contained in this report by year, country, company and applicants. The detailed technologies are divided, analyzed by absorber layer construction/vacuum deposition/nano power as well as substrate/buffer-

layer/window layer/electrode/patterning. Especially, this report contains the list and analysis of key patents major companies applied for on whole CIS field and also let companies in R&D stage understand the patent rights and development direction of technology.

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