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Effective and Scalable Solar Energy Collector and Storage

Tech ID: 22042 / UC Case 2011-263-0

BACKGROUND

Due to increasing oil production and accelerating global warming, the need to develop clean, sustainable, and inexpensive energy supplies is growing. Renewable energy sources lower the world’s dependence on fossil fuels, and at the same time decrease carbon dioxide emissions. Currently, however, renewable energy sources can be more expensive in the short-term than nonrenewables, and little electricity is produced from solar energy or wind power. UCSC researchers have successfully demonstrated the direct conversion of solar energy into electricity by a low-cost solar thermoelectric system. Contrary to other expensive solar electricity systems, a solar thermoelectric system increases energy conversion efficiency. This scalable new solar system is able to collect 10 times more solar energy and is relatively cost effective for residential applications. Moreover, solar radiation output is consistent throughout the day and is not affected by cloud coverage in this thermoelectric system.

TECHNOLOGY DESCRIPTION

Researchers at UC Santa Cruz have developed a scalable solar energy collector and storage system, which can be used in residential homes or commercial properties. Our first-in-class thermoelectric solar system has been tested and does not decrease solar radiation output during the night or on cloudy days; the system would not go into standby mode, and consumers would not need to draw power from the utility grid. One problem with current solar electricity generation is that a substantial amount of solar energy is wasted in the form of heat. Our solar technology can recycle this waste into a usable energy stream, and therefore our solar thermoelectric technology collects the thermal energy from the sun and uses this heat to provide hot water, space heating, cooling, and pool heating for residential, commercial, and industrial applications. Approximately 72% of energy is used for water heating, space heating and space cooling in the U.S., which represents a huge market potential for this system. This new approach can collect up to 80% of the solar energy combined with heating liquid or solid substances. The invention incorporates a solar ray tracker, solar concentrator, thermoelectric converters, heat exchangers and an innovative storage thermal system to generate and manage thermoelectric power.

APPLICATIONS

- Solar energy collection and storage

ADVANTAGES

- Cheaper than all currently available renewable and nonrenewable energy systems

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OTHER INFORMATION

KEYWORDS

Solar energy systems, solar panels, solar concentrators, energy collector, storage systems, thermal energy, electricity, solar water heating, solar heating, solar distillation, solar electric power generation, solar thermal power production

CATEGORIZED AS

- **Energy**
- **Solar**

RELATED CASES

2011-263-0

- ▶ Increased solar conversion efficiency: collects more than 80% of solar energy compared to current systems collecting 20%
- ▶ Solar energy cost could be reduced by more than 50%
- ▶ Materials to build technology are inexpensive and easily available
- ▶ Simple and eco-friendly design
- ▶ Does not decrease solar radiation output during the night or on cloudy days
- ▶ No standby mode, and consumers would not need to draw power from the utility grid
- ▶ Excels at all temperatures

INTELLECTUAL PROPERTY INFORMATION

Country	Type	Number	Dated	Case
United States Of America	Issued Patent	9,705,449	07/11/2017	2011-263

Additional Patent Pending

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