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Photovoltaic that is Ultra-thin and Light for use in Buildings

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Introduction

The Integrating solar thermal collectors and photovoltaic modules into the building envelope is critical for achieving the current objective of producing net-zero and plus-energy structures. Photovoltaic/ thermal hybrid (PVT) collectors have been proposed to maximise energy harvest [1].

The solar cells act as an absorber in a PVT collector, capturing the incident solar light. A portion of the radiation is converted to electricity (usually 10-20%), while the rest is turned to useable heat in a neighboring thermal collector. As a result, a PVT collector can not only produce heat for building systems, but also improve the power generation of solar cells by reducing their temperature. A variety of PVT collector concepts have been presented in the past based on use (e.g. air/water pre-heating, hot water for domestic/industrial use, etc.) and location-dependent circumstances (e.g. climate and orientation).

Description

Design (e.g. glazing, concentration, degree of integration) and kind of heat removal (natural/forced fluid/gas flow) were used to categorize the various proposals, PVT class definitions include liquid/air PVT, covered/uncovered PVT, and concentrating PVT, depending on the type of solar cell (e.g. monocrystalline/polycrystalline silicon, thin-film solar cells, etc.) and the type of solar cell (e.g. monocrystalline/ polycrystalline silicon, thin-film solar cells, etc.). The level of thermal insulation has been offered as an alternative classification in recent years [2].

Improved insulation (for example, side and rear insulation, as well as an additional transparent cover) is associated with higher stagnation temperatures, which raises issues relating to material temperature resistance, long-term degradation, thermal expansion, and overheating prevention [3].

The majority of PVT collectors are based on a standard glazed flat plate collector design, which consists of a rectangular rear- and side-insulated box with a glass cover of around $2m^2$. The collectors are somewhat heavy, thick, and only available in conventional dimensions from the standpoint of structures, limiting the number of sites suitable for installation and limiting architectural integration quality. Furthermore, they are often designed for operation temperatures above 50°C, rather than the seasonal energy demands of buildings. Moderate supply temperatures, for example, are aimed to leverage important energy sources in the Low Ex Building idea -a viable strategy for zero emission buildings. The combination of thermally activated building systems (TABS) for low temperature space heating is an example of such a system, an efficient heat pump, a borehole thermal storage system, and solar collectors that provide heat at 20-35°C. Unglazed collectors, such as low-cost plastic or channel-plate thermal collectors commonly used in pool heating applications can efficiently supply these low temperatures [4].

Unglazed solar thermal collectors are easy to build, inexpensive, and have high heat exchange rates with the environment, resulting in low stagnation temperatures. Unglazed collectors are great candidates for low-temperature PVT collectors, such as in conjunction with thin-film solar cell laminates, due to these features.

The current research focuses on "unglazed" PVT collectors, or those that are constructed totally without glass. Thin-film solar cells encased in thin plastic sheets are employed instead. When compared to glazed PVT collectors, this provides in a significant weight decrease, Solar cells, which are usually made of crystalline silicon, are sandwiched between two layers of glass and/or protected by a glass cover. A thermal collector based on roll bond or extrusion processes is also planned to further minimize the weight and thickness. The light and thin PVT collector that results should make installation easier and improve architectural integration [5].

Two alternative PVT collector designs, dubbed "channel-plate" and "tube-foil," are researched in depth to discover crucial variables impacting thermal and electrical performance as well as architectural integrality. Flexible 3mm thick CIGS solar modules are glued to a 0.4m wide, 1.8m long, and 3mm thick channel-plate collector made from multiport extrusion (MPE) aluminum micro channel profiles with a total of 108 parallel channels, and a 0.6m wide, 2m long, and 3mm thick tube-foil collector made from a polypropylene capillary mat with 54 parallel tubes and covered by a thin aluminium foil. The header tubes, which deliver water to the thermal collector channels/tubes, increase the overall thickness of the thermal collector to around 20mm at the inlets and outlets.

Conclusion

The prototypes were mounted on a tilted, insulated wooden frame to simulate the incorporation of a roof or façade into a building. Experiments were carried out in the wintertime in Zurich, Switzerland, in sunny conditions. The PVT collector was supplied with water at a consistent temperature using a commercial water chilled system. Pt100 sensors were mounted at the collector water input and outlet, respectively, to measure temperature increase across the collector. A magnetic flow meter was used to manually control the water mass flow. Pyrometer and anemometer were used to measure irradiance and wind speed, respectively. IR thermography was also used to measure surface temperature distributions.

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Conflict of Interest

None

References

1. Joshi N, Kolte MT (2013) Digital Hearing Aid-A Review. Int j adv res electr 1:369-372.
2. Turner CW, Humes LE, Bentler RA, Cox RM (1996) A review of past research on changes in hearing aid benefit over time. Ear Hear 1:14-25.
3. Kochkin S, Beck DL, Christensen LA, Compton-Conley C (2010) MarkeTrak VIII: The impact of the hearing healthcare professional on hearing aid user success. J Speech Lang Hear Res 17:12-34.
4. Johnson CE, Danhauer JL, Ellis BB, Jilla AM (2016) Hearing aid benefit in patients with mild sensorineural hearing loss: A systematic review. J Am Acad Audiol 27:293-310.
5. Ng JH, Loke AY (2015) Determinants of hearing-aid adoption and use among the elderly: A systematic review. Int J Audiol 54:291-300.