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Holographic window for solar power generation system

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In case of building-integrated photovoltaic (BIPV), photovoltaic materials are used to replace conventional building materials. Additionally the vehicle-integrated photovoltaic (VIPV) is argued that the hybrid electric vehicles (HEV) create an opportunity for PV to serve as an energy source for the transport sector. However Conventional PV unit is Solid and Shade, it means the total construction cost becoming considerably high. Our research aims to develop high-value technology that make open up new markets and accelerate the expansion of the field of introduction of the photovoltaic power generation. We have proposed and demonstrated the brand-new see-through-window type photovoltaic generating unit by applying holographic technologies called "Holographic Window (Holo-Window)". By skillfully using phenomena such as diffraction of light, reflection and refraction, the sunlight through windowpane is captured into the glass plate. By increasing diffraction angles (reflection from hologram in this case) more than critical angle of the glass inside, the sunlight leaded to the end edge of the glass. Small-ribbon-shape low-cost solar cells placed on windowsill. While the captured light travel to the glass edge, another captured light are also combining and then light intensity can be increasing dramatically. I will introduce the basic principle of Holo-Window, including the optical configuration and requirement of hologram characteristics, the hologram fabrication technology to achieve high diffraction angle for capturing the sunlight into the glass plate and I will discuss the performance of Holo-Window experimentally.

Biography

Toshihiro Kasezawa graduated from Shizuoka University in 1984 and he managed many companies of the technical system. He is an Inventor of Holo-Window. In 2012, he applied a patent of the hologram research and development "stereoimage projection device". In 2013, he applied a patent of the hologram research and development "collecting mechanism, light of the sun electrical generator, window structure and windowpane". He won the Best Paper Award at IWH (International Workshop on Holography and Related Technologies) 2015 Okinawa and also IWH 2016 Taiwan. His article "Holographic window for solar power generation" was appeared in the Optical Review (2016).

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