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Advances in Crystalline Silicon Solar Cell Technology

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Industrial crystalline silicon (c-Si) solar cells with using a screen printing technology share the global market over 90% and they will continue to be the same for at least the next decade. It seems that the 2nd generation and the 3rd generation technologies have not yet demonstrated competitiveness in terms of performance and cost.

In 2014, new world record efficiency 25.6% (Area-143.7 cm², Voc-0.740V, Jsc-41.8 mA/cm², FF-0.827) was announced from Panasonic and its cell structure is Back Contact HIT* c-Si solar cell. Here, amorphous silicon passivated contacts were newly applied to back contact solar cell. On the other hand, 24.9% TOPCon** cell was announced from Fraunhofer ISE and its key technology is an excellent passivation quality applying tunnel oxide (<2 nm) between metal and silicon or emitter and base.

As a result, to realize high efficiency, high functional technologies are quite required to overcome a theoretical limitation of c-Si solar cell efficiency.

In this presentation, Si solar cell technology summarized in the International Technology Roadmap for Photovoltaics (**ITRPV 2014) is introduced, and the present status of R&D associated with various c-Si solar cell technologies will be reviewed. In addition, national R&D projects of c-Si solar cells to be performed by Korea University are shown briefly.

*HIT: Hetero-junction with Intrinsic Thin layer

**TOPCon: Tunnel Oxide Passivated Contact

***International Technology Roadmap for Photovoltaics (ITRPV), www.itrpv.net

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