Skysong Innovations
Advancing the Arizona State University Knowledge Enterprise

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Flexible Silicon Infrared Emitter

Effectively passivating a silicon cell leads to higher open circuit voltages and high efficiencies necessary for various electronic applications. Surface passivation is relevant for thinner wafers where recombination at the surface dominates total recombination. Thinner wafers are necessary as the voltage increases as a function of the excess carrier density. Therefore, there is a need to design a thin silicon cell with high open circuit voltage.

Researchers at ASU have developed a method to produce ultra-thin silicon able to emit light. The structures are solar cells grown intrinsically and doped hydrogenated amorphous layers. The high open circuit voltages and high efficiencies result in high radiative efficiencies, leading to high radiative emission in the infrared. Plasma treatment improves the passivation and sputtered indium tin oxide sputtered on both sides optimizes absorption in the infrared region. By applying electricity to the cell terminals, the cell illuminates. Due to the thickness and high performance, the cells are effective flexible silicon infrared emitters.

Potential Applications

- Communications
- Lighting and illumination applications
- Military

Benefits and Advantages

- Scalable – The device can be manufactured at the large scale
- Flexible – The thin film nature of the cell allows flexibility
- Cost-Effective – The device doubles as a solar cell giving it the potential to be energy self-sufficient

For more information about the inventor(s) and their research, please see

Stuart Bowden's directory webpage