

Solar Bond - Development of high efficiency multi-junction solar cells on reclaimable substrates

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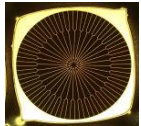
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in space...

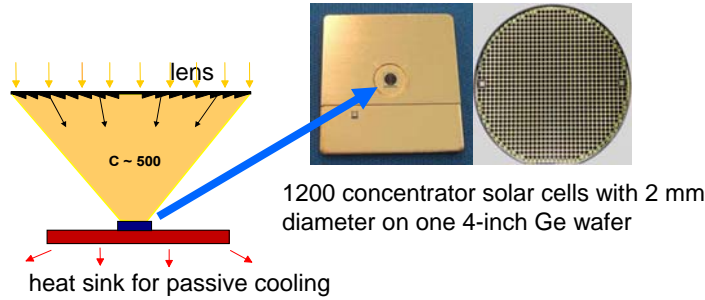
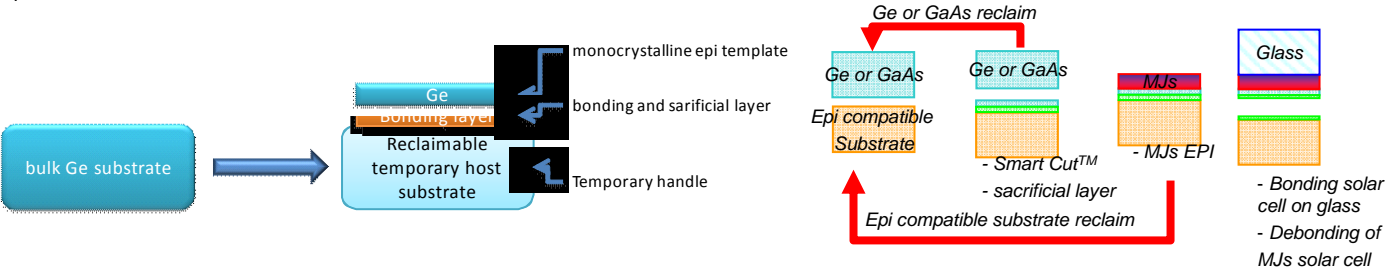


... and on earth



Objectives of the project and challenges

In this project, we want to demonstrate a new alternative substrate which can serve as a template for the growth of high efficiency multi-junction solar cells. With this template, all the requirements needed to replace the bulk Ge or GaAs wafers can be met, *i.e.* a thin film monocrystalline epi template on top of a handle made out of materials compatible with high temperature epi processes. The III-V solar cell structures can be removed from the alternative substrates by using a debonding process involving engineered sacrificial buried layers which shall also be developed as part of this project. This new technology could lead to a breakthrough in high efficiency solar cell processing with significantly lower production costs in the future.



Creation of long-term strategic French-German alliances

By generating a close link between the research partners Fraunhofer ISE and CEA-LETI in the "SolarBond" project, the development of new and advanced products for the European industry will be supported. Due to the complementarity of the technologies available in each of our research institutes, and driven by the booming solar market, it is highly believed that the realization of the "SolarBond" project will lead to new innovative ideas for future research collaboration.

Expected results and market opportunities

It is expected that the „SolarBond“ project will lead to the successful demonstration of a high efficiency ultra thin multi-junction solar cell which is removed from the substrate after the epitaxial growth. The industrial feasibility and the cost advantage of this new approach will be investigated.

Besides the advantage of lower costs, the project will also show the benefits of the new approach leading to 10 μm thin lightweight devices which offer great advantages for the power generation in space. The power/mass ratio of a typical space solar cell will be reduced by a factor of 10-20, using the new technology. Lowering the cost of the III-V multi-junction solar cells by debonding techniques as well as reducing the thickness of these devices are two important fields that need to be addressed in the future. The space industry as well as the European Space Agency is pushing this development forward to increase the power/mass ratio of today's solar cell technology. At the same time the ultra-thin solar cells offer the potential to reduce the costs of these devices considerably.