physikalisches Kolloquium

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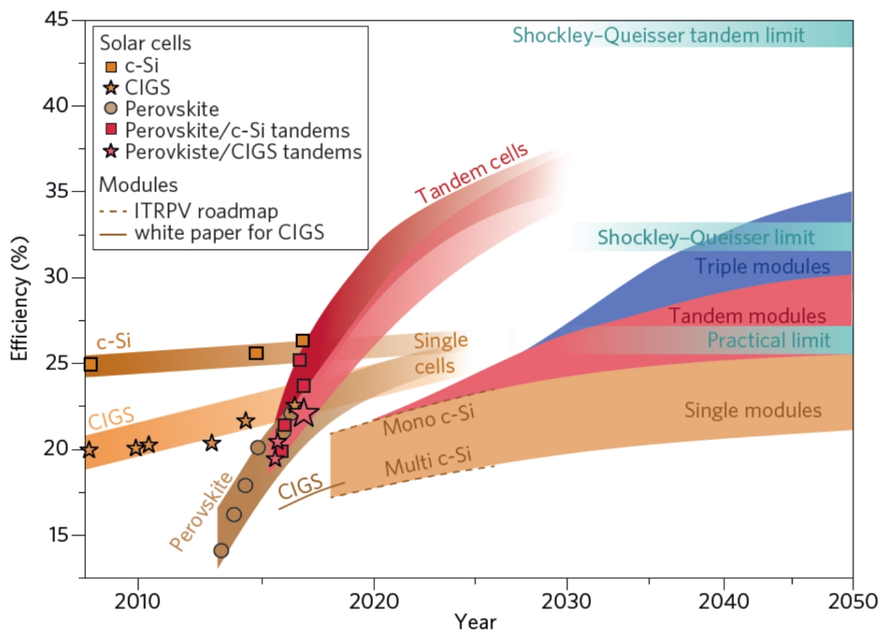
# Prepare(d) for Impact - Next Generation Silicon Solar Cells

Mo. 25.06.18
16:00 Uhr
Ort: H34

Photovoltaics (PV) has become the energy technology with the lowest levelized costs of electricity generation in Germany, well below 4 ct/kWh. This success is driven by the enormous cost reduction of the crystalline silicon (c-Si) technology.

However, the solar conversion efficiency record for c-Si has reached 26.6 %, which is already very close to the practical limit defined by Auger recombination, being 29.4 %. The roadmap for c-Si predicts further cost reduction potential through thin-film strategies and an increase of the efficiency limit through multi-junction approaches, spectral conversion or multi-exciton generation schemes. These new concepts require perfect interfaces, optimal charge-selective contacts, both combined with excellent light management strategies. This necessitates novel dedicated research platforms, which allow a more knowledge driven material and device development.

In this presentation, I will review the status of PV and discuss in detail the above mentioned scientific challenges and present promising results on thin film c-Si and Perovskite/c-Si tandem solar cells. I will also introduce the **E**nergy **M**aterials **I**n-Situ **L**aboratory (EMIL), which combines state-of-the-art thin-film synthesis with in-system and operando X-ray analysis of materials and devices for energy conversion and storage, located at the BESSY II synchrotron. EMIL will allow resolving of the physical and chemical constraints of buried interfaces and match them to the needs of solar cell and solar fuel devices.




*The projected evolution of the efficiency of silicon-based solar cells (from Albrecht et al. Nat. Energy 2, 16196 (2017)).*