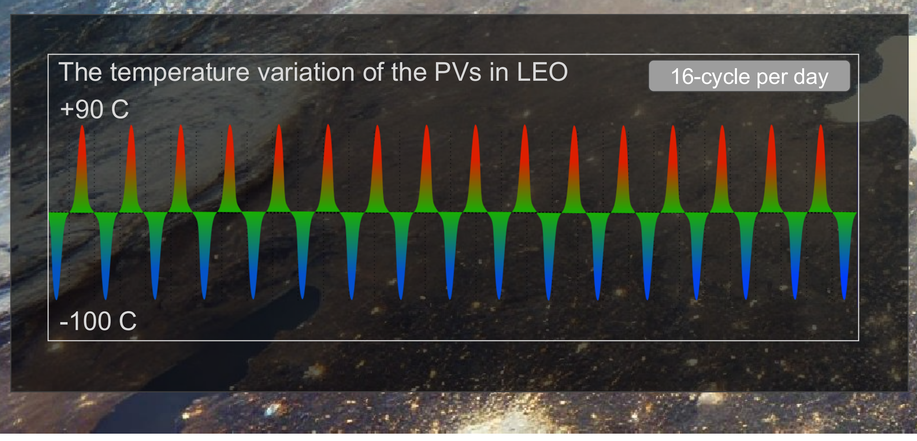
Looking for a Master's Thesis?



Predicting Stress and Failure in Solar Cells Under Thermal Cycling via Multiphysics Modeling

This master thesis project focuses on simulating the thermal cycling behavior of perovskite-based solar cell stacks using multiphysics simulation, with an emphasis on stress distribution, interfacial delamination, and failure mechanisms. Various device architectures, including single-junction and tandem structures, will be investigated to assess their mechanical robustness under repeated temperature fluctuations. To improve the accuracy of the models, the student will also conduct experimental measurements of key physical properties—such as Young's modulus and thermal expansion coefficients—of individual layers using appropriate techniques. These values will be integrated into the simulations to provide realistic insights into how different materials and interfaces respond to thermal cycling. The results will help inform the design of more durable perovskite solar cells for deployment in harsh environments such as space or extreme terrestrial conditions.

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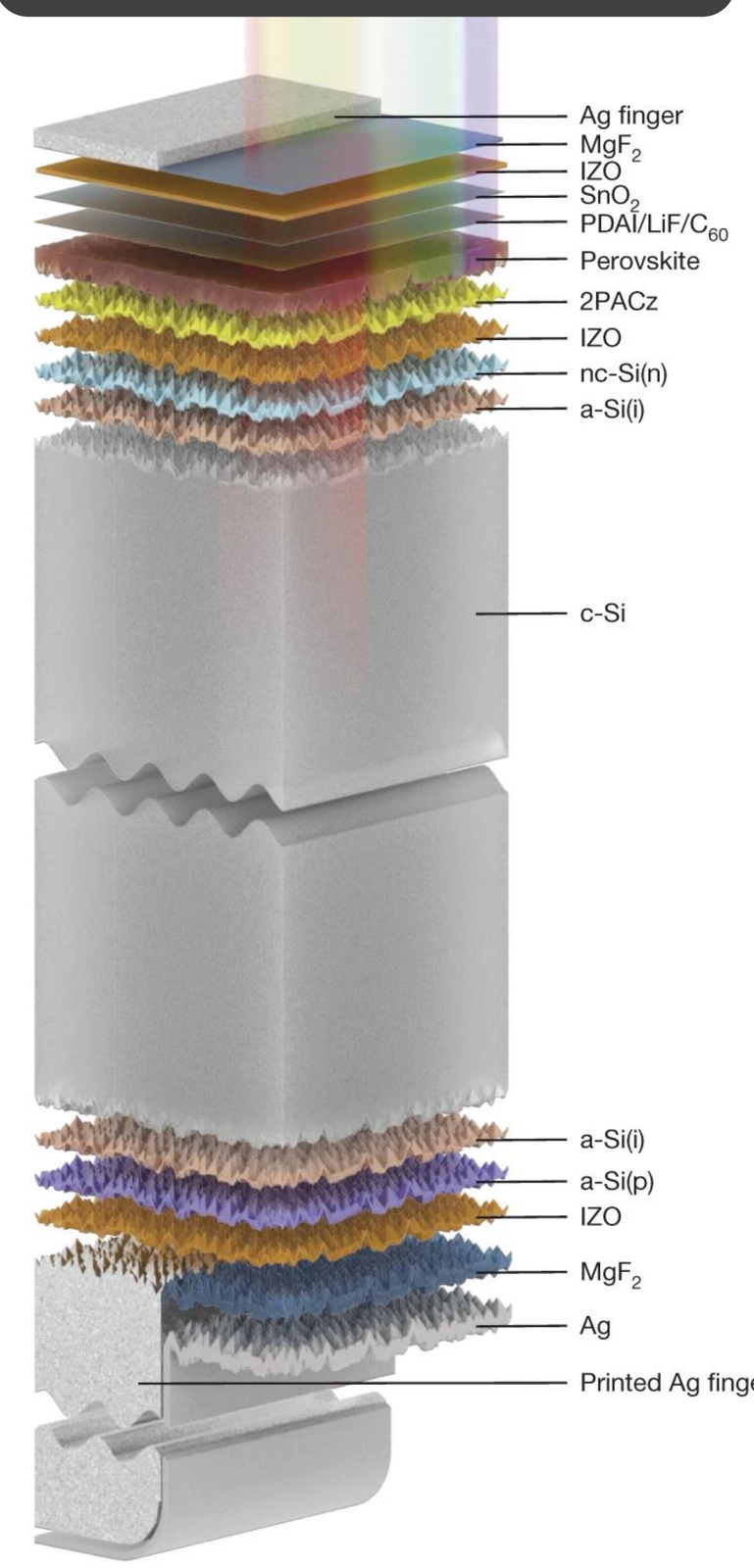
Interested?

Prof. Markus Zimmermann
zimmermann@tum.de

Dr. Erkan Aydin
erkan.aydin@cup.uni-muenchen.de



This thesis will be jointly co-supervised by the Laboratory for Product Development and Lightweight Design (LPL) at TUM and the Aydin Group in the Department of Chemistry at LMU Munich.

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Briefly, we work on state-of-the-art, high-efficiency lead-based perovskite solar cells, with a focus on tandem architectures for space applications—particularly for low Earth orbit telecommunication satellites. We develop solar cells that are resilient to the extreme conditions of space through a multifaceted approach. This is a highly interdisciplinary topic, requiring collaboration among mechanical-electronics engineers, materials scientists, and experts in fundamental domains such as physics and chemistry.