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Press release

Universität Potsdam
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Scientific Publications
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Record Efficiency – Tandem Solar Cells made from Perovskite and Organic Material

Trying to improve the efficiency of solar cells to become independent from fossil energy sources is a major goal of solar cell research. A team around the physicist Dr. Felix Lang from the University of Potsdam, Prof. Lei Meng and Prof. Yongfang Li from the Chinese Academy of Sciences, Beijing, now combine perovskite with organic absorbers to form a record-level tandem solar cell as reported in the scientific journal "Nature".

Combining two materials that selectively absorb short and long wavelengths, e.g., blue/green and red/infrared parts of the spectrum, makes the best use of our sunlight and is a well-known strategy to increase efficiency in solar cells. Best red/infrared absorbing parts of solar cells so far were, however, made from traditional materials, such as silicon or CIGS (copper indium gallium selenide). Unfortunately, these require high processing temperatures, and thus exhibit a relatively high carbon footprint.

In their work, now published in "Nature", Lang and colleagues combine two emerging solar cell technologies, namely perovskite and organic solar cells, that both are processed at low temperatures with a low carbon footprint. Achieving a record level of 25.7 % efficiency for this new combination, however, was not easy, says Felix Lang: "This was only possible by combining two major breakthroughs." First, Meng and Li synthesized a novel red/infrared absorbing organic solar cell that extends its absorption even further into the infrared. "Still, tandem solar cells were limited by the perovskite layer, which shows strong efficiency losses if adjusted to absorb only blue/green parts of the sun spectrum", he explains. "To tackle this, we utilized a novel passivation layer applied to the perovskite that reduces material defects and improves the performance of the whole cell."

Link to Publication: Jiang, X. et al. Lang, F. & Li, Yongfang, Isomeric diammonium passivation for perovskite–organic tandem solar cells. Nature (2024), https://doi.org/10.1038/s41586-024-08160-y

Images:
Schema_Felix Lang: Schematic representation of perovskite-organic tandem solar cell setup. Image Credit: Felix Lang.
Lang und He_C. Thee Vanichangkul. Felix Lang and Guorui He with perovskite OPV solar cells. Photo: C. Thee Vanichangkul
Solarzelle _C. Thee Vanichangkul. Solar cell with passivation in the laboratory under simulated sunlight. Photo: C. Thee Vanichangkul

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Felix Lang and Guorui He with perovskite OPV solar cells.
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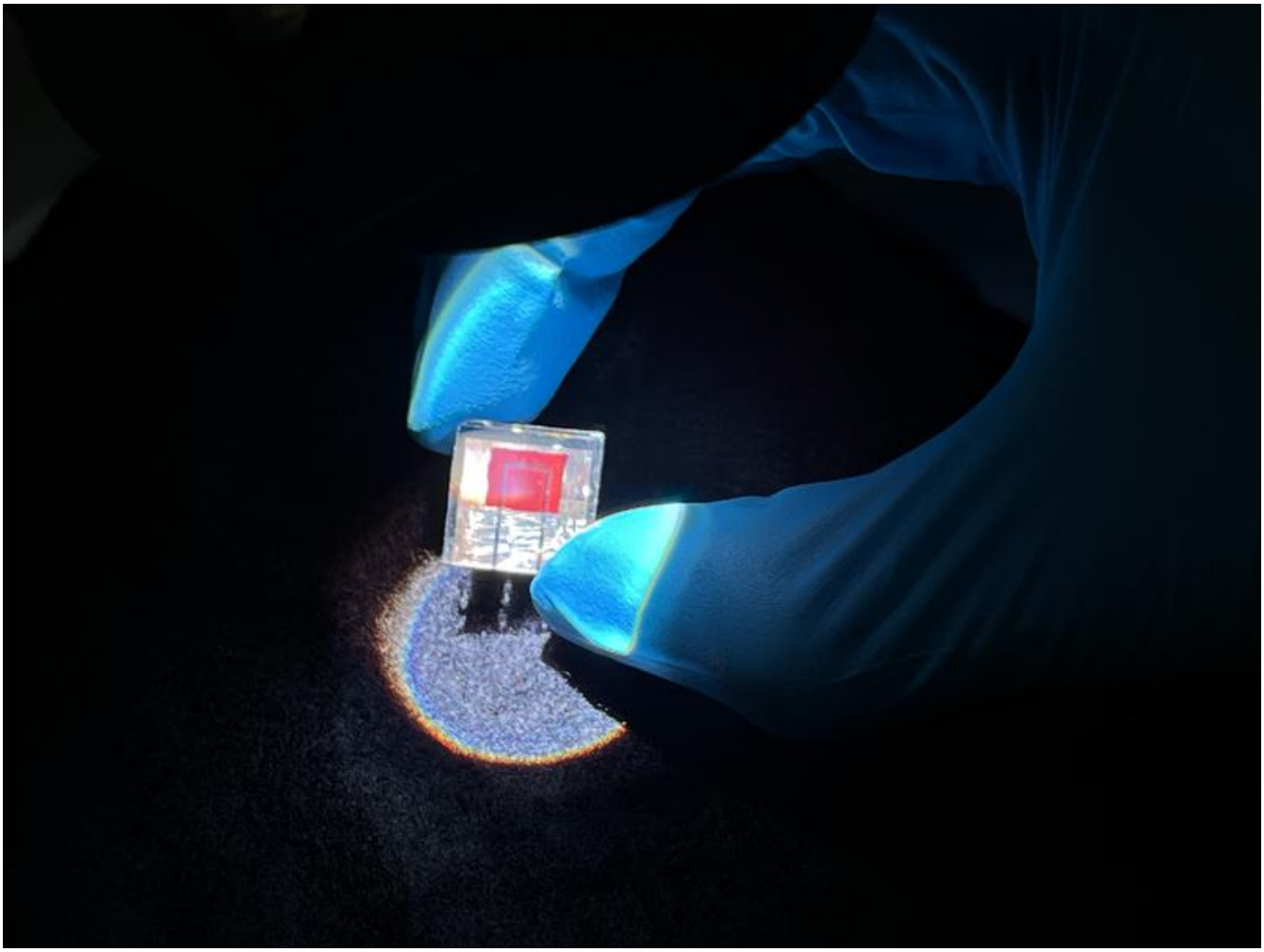

Solar cell with passivation in the laboratory under simulated sunlight.
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