

Università degli Studi di Padova  
Dipartimento di Scienze Chimiche

*Ciclo di Seminari 'Frontiers in Chemistry'*

## Prof. Stefaan De Wolf

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### *Pathways to Efficient and stable perovskite/silicon tandem solar cells*

**Venerdì 21 Aprile 2023, ore 14.30, Aula F del Centro Interchimico,  
Via Marzolo 1, Padova**

Il seminario potrà essere seguito anche sulla piattaforma zoom:

<https://unipd.zoom.us/j/87961221276>

Meeting ID: 879 6122 1276

In this presentation I will discuss the multiple ways how monolithic perovskite/silicon can be fabricated, built from textured silicon heterojunction solar cells, with an emphasis on solution of the perovskite top cell. Bulk and contact passivation of the perovskite are instrumental to obtain a high performance, which can be obtained through molecular additive engineering. This will be followed by a discussion about the outdoor performance of such tandems and the need for robust and perovskite-compatible encapsulation to do so. I will then move on to discuss reliability aspects of such tandems under accelerated degradation tests such as damp-heat testing, as well as possible mechanical failure due to top-contact delamination. I will conclude my talk with arguing how bifacial perovskite/silicon tandems aid in improved performance as well as stability, thanks to their reliance on narrow-bandgap perovskites for optimal performance.

R. Azmi, ..., S. De Wolf, Damp heat-stable perovskite solar cells with tailored-dimensionality 2D/3D heterojunctions, *Science*, 376, 6588, 2022.

FH Isikgor, ..., S. De Wolf, Concurrent cationic and anionic perovskite defect passivation enables 27.4% perovskite/silicon tandems with suppression of halide segregation, *JOULE*, 5, 1566, 2021.

C. Altinkaya, ..., S. De Wolf, Tin Oxide Electron-Selective Layers for Efficient, Stable, and Scalable Perovskite Solar Cells, *Adv. Materials*, 33, 2005504, 2021.

M. De Bastiani, ..., S. De Wolf, Efficient bifacial monolithic perovskite/silicon tandem solar cells via bandgap engineering, *Nature Energy*, 6, 167, 2021.

#### Short Biography

Stefaan De Wolf received his Ph.D. degree, in 2005, from the Katholieke Universiteit Leuven in Belgium, during which time he was also affiliated with imec in Belgium. From 2005 to 2008, he was with the National Institute of Advanced Industrial Science and Technology (AIST), Tsukuba, Japan. In 2008, he joined, Ecole Polytechnique Federale de Lausanne (EPFL), Switzerland, as a team leader for its activities on high-efficiency solar cells. Now, he is a Professor of Material Science at King Abdullah University of Science and Technology (KAUST) in Saudi Arabia, focusing on high-efficiency silicon and perovskite solar cells, their combinations in perovskite/silicon tandem solar cells, as well as photovoltaics for sunny and hot climates. He is Clarivate Highly Cited Researcher since 2019.

**Prof. Michele Maggini**  
*Direttore del Dipartimento  
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