The new generation of multijunction solar cells: perovskite/silicon tandems

Dr. Michele De Bastiani, PhD
Research Scientist
King Abdullah University of Science and Technology
KPVLAB
KAUST Solar Center

Friday 2nd December 2022, h. 14:30, U5, aula Seminari, 1st floor

The mainstream crystalline silicon photovoltaic technologies are approaching their practical limits. To further gain in performance, the best silicon technology can be coupled with other semiconductors to realize multijunction configurations with efficiencies beyond 30% for the residential and utility-scale market. Halide perovskites are a recent class of semiconductors with remarkable optoelectronic properties, such as steep absorption coefficient, low voltage losses, and bandgap tunability. The latter enabled the coupling with silicon heterojunctions for the realization of tandem solar cells with efficiency >31%. Unfortunately, the lack of stability of perovskites is currently the roadblock toward the commercialization of the tandem, which looks at the silicon standards of 25 years and more of warranties. In this talk, I will revise the materials, the processes, and the strategies that enabled record-efficient tandems with particular attention to the mechanisms that affect the stability of the performances, comparing lab experiments with more than a year of outdoor data.

CV Dr. Michele De Bastiani

Michele De Bastiani obtained his Ph.D. in 2016 from the University of Padova in collaboration with the Italian Institute of Technology in Milan, studying the optoelectronic properties of halide perovskite solar cells. He then moved to King Abdullah University of Science and Technology (KAUST) in Saudi Arabia where he consolidated his background in the field of silicon heterojunctions first and perovskite/silicon tandems later. He was recognized with the ENI award: Young researcher of the year in 2018 for the outcome of his research. Since 2019, he is co-founder of Mirai Solar a company operating in the agrivoltaic sector commercializing foldable and light-transmitting silicon solar modules.