

# WOMEN IN RENEWABLE ENERGY

## WiRE - 2022

### **Impact of chopping frequency and voltage/light bias during EQE measurements of perovskite/Silicon tandem solar cells**

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#### Abstract

EQE measurements have been carried out in perovskite single and tandem structure at different voltage/light biases and chopping frequencies in an attempt to investigate the impact of those factors on the EQE of the devices. The EQE measurements of perovskite/Silicon tandem device present more challenges compared to EQE measurement procedures of the single-perovskite devices due to the series connection of junctions inside the tandem structure. Therefore, detailed investigation of the voltage/light bias is required. Voltage bias studies have been carried out in perovskite single junction devices as well. The impact of chopping frequency has been studied in a perovskite tandem device through time response analysis method to establish the appropriate frequency for EQE measurements of perovskite devices.

Voltage bias EQE dependent measurements demonstrates no change at different voltages in both perovskite single and tandem structures indicating that voltage does not have an impact during those studies. Chopping frequencies in the range from 5-70 Hz have been applied on perovskite/Si tandem cells. For that purpose, an initial quantitative time response analysis was undertaken using oscilloscopes followed by complete EQE measurements at various chopping frequencies. The complete EQE measurements during that procedure have been studied at two different wavelengths to cover the response of both junctions in the tandem device. No EQE measurement dependence on chopping frequency was detected in the measurements indicating that the frequency is not an issue during the EQE measurements of perovskite tandem solar cells. Finally, light bias measurements have demonstrated that the minimum light bias conditions for measuring perovskite top in the perovskite/Si tandem configuration are  $13\text{W/m}^2$ . However, this value depends strongly on the performance and technology of the perovskite under test and more studies should be implemented to extract more reliable results.

#### References

[1] Paraskeva V., Hadjipanayi M., Ho-Baillie A., Daukes N.E., Zheng J., Georghiou G.E." Proc. 36th EUPVSEC 2019, 772-774, ISBN: 3-936338-60-4

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