



# Development of an LED-based Light Source with Selectable Wavelengths, Intensities, and Illumination Periods for Renewable Energy Research

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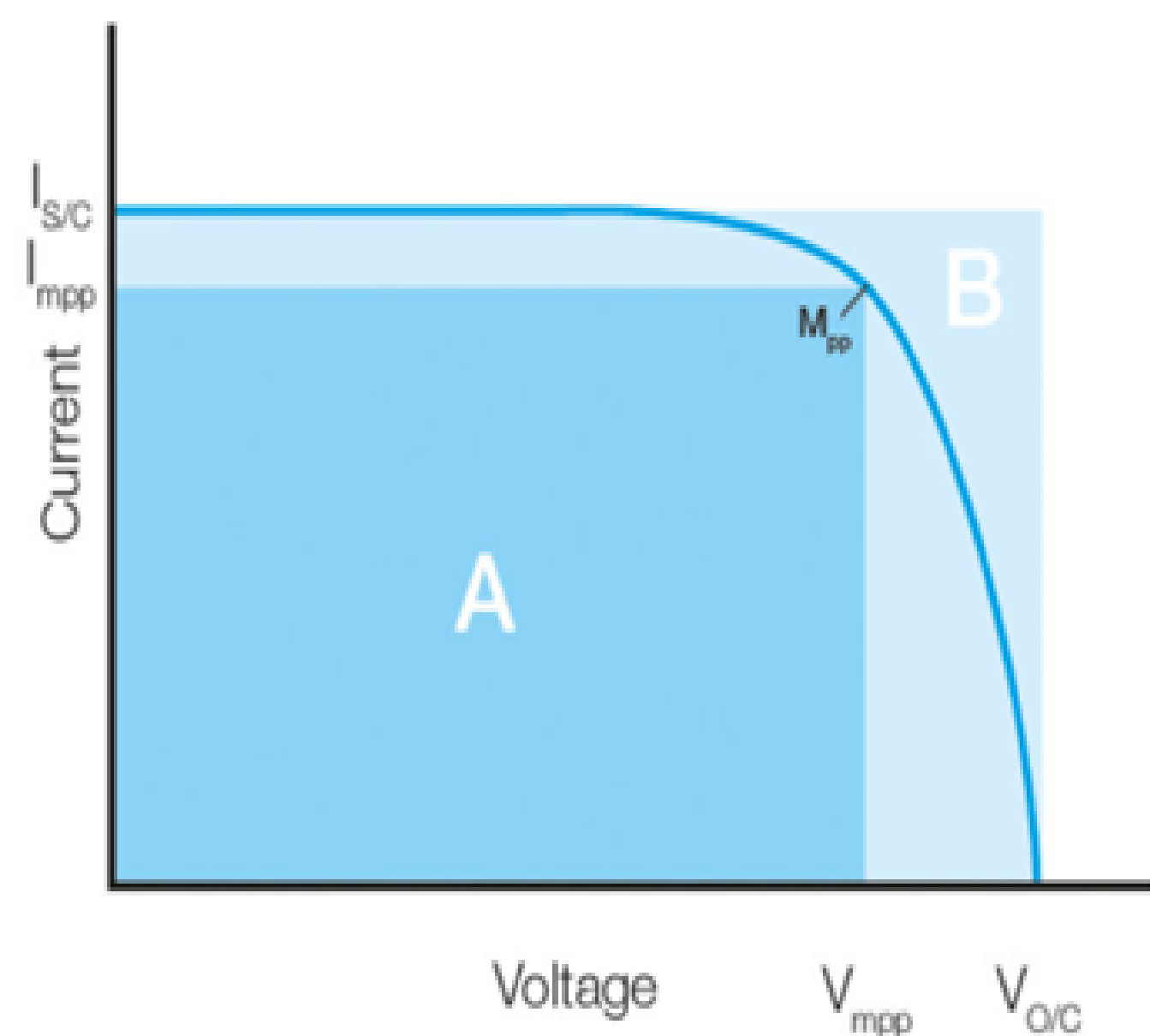
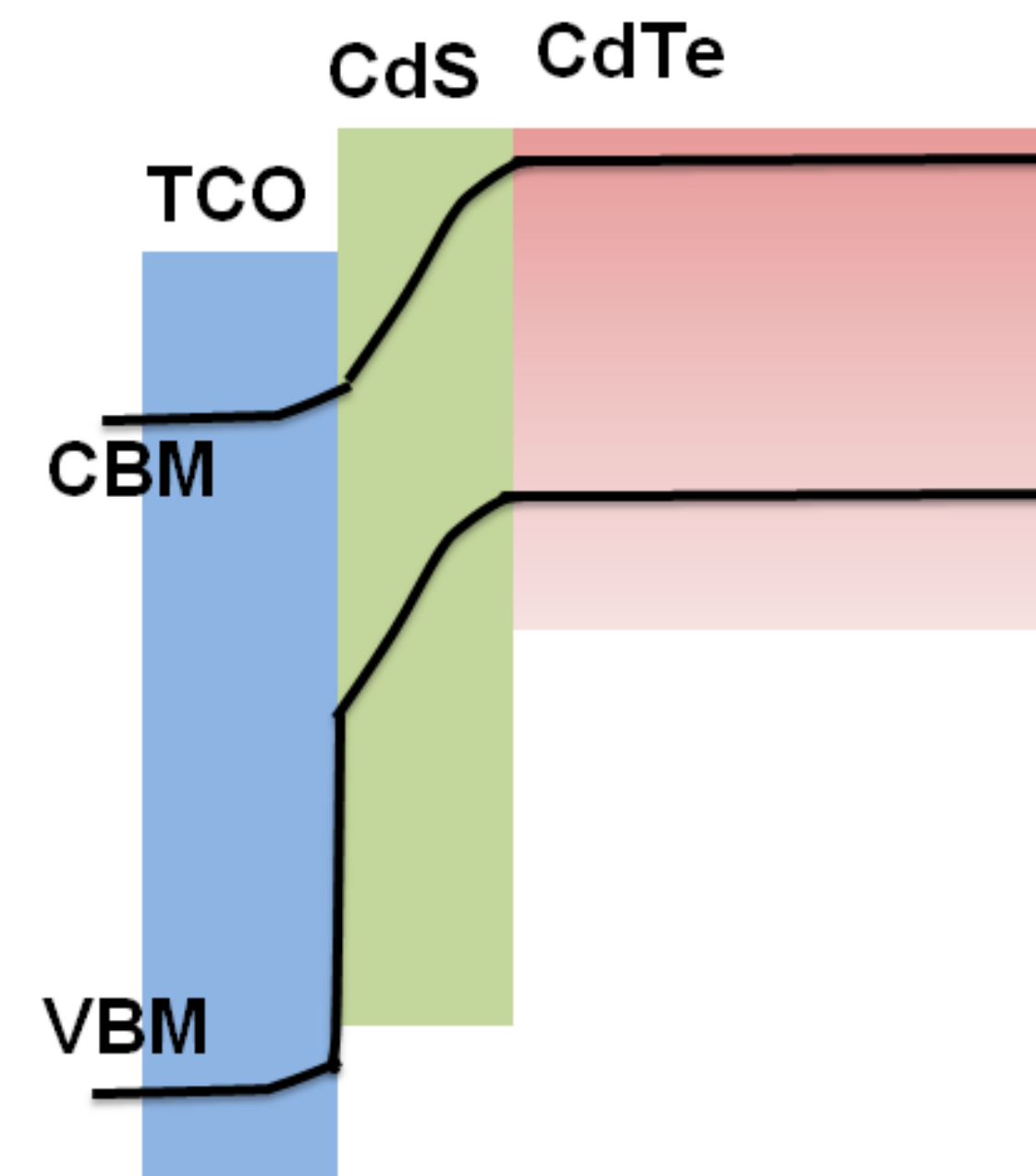


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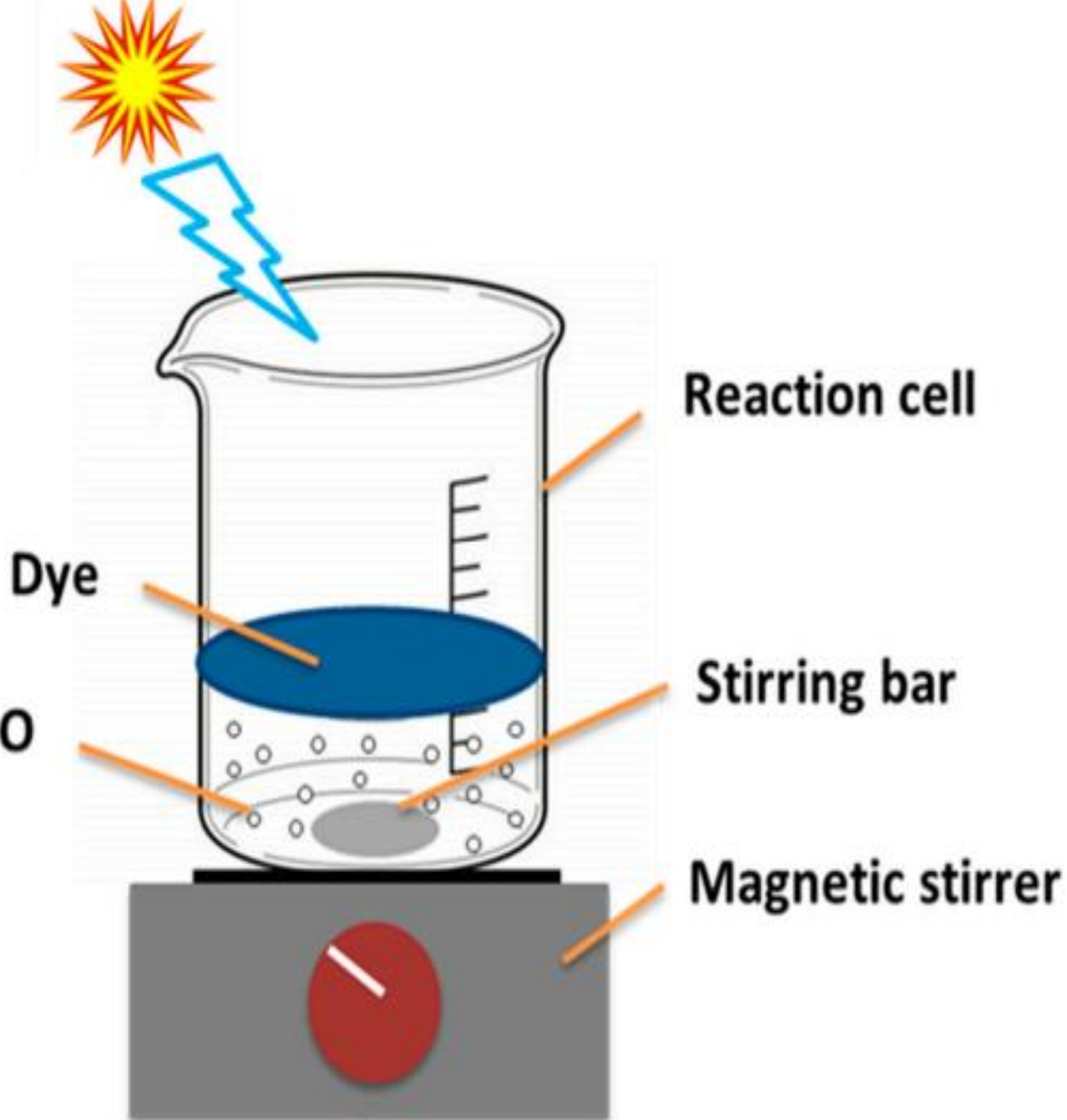


## Background

### Applications of a Light Source



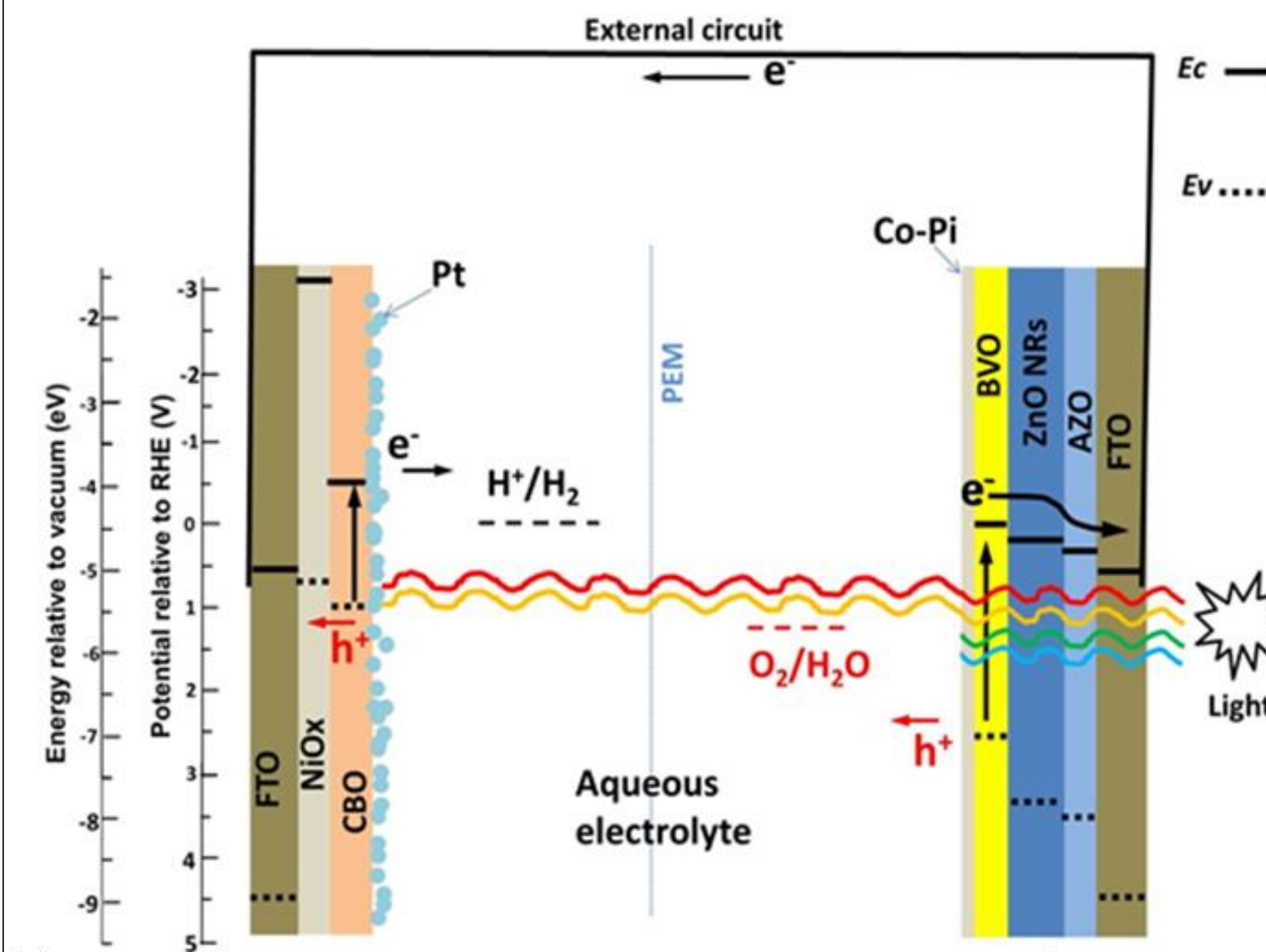
Quality of different layers and interfaces of solar cells



Photocatalytic degradation of textile dyes\*

\*Kabir et al. Journal of Composites Science(2020), 4(2),49, <https://doi.org/10.3390/jcs4020049>

Efficiency of solar cells



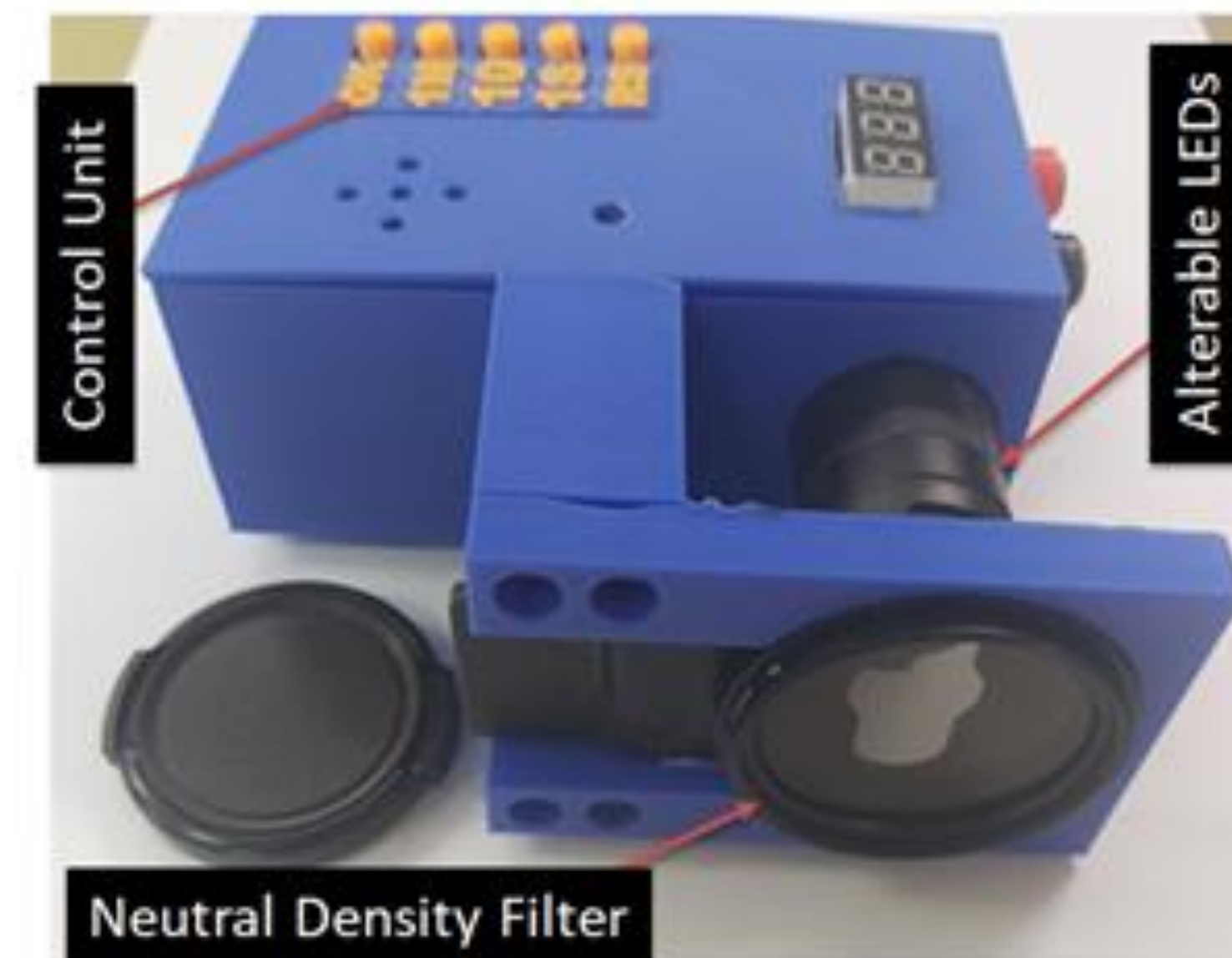
Photoelectrochemical water splitting\*

\*Mend. Data, vol. 3, 2022. <https://doi.org/10.17632/b7x8khs65.3>

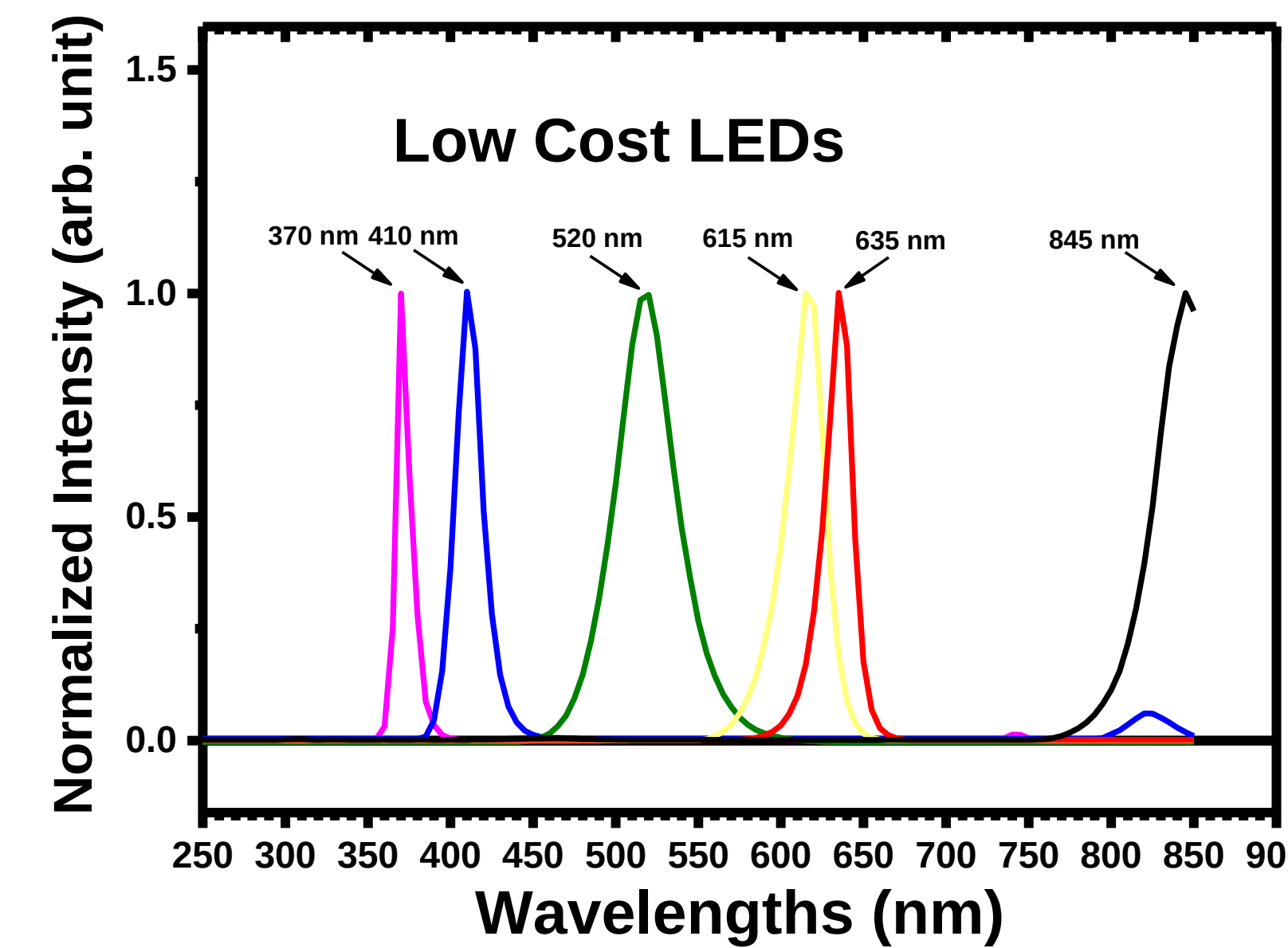
### Limitations of a Conventional Light Source

- ❑ Expensive
- ❑ Limited regulation or adjustment of wavelength, intensity and illumination period
- ❑ Not portable
- ❑ Limited to specific application

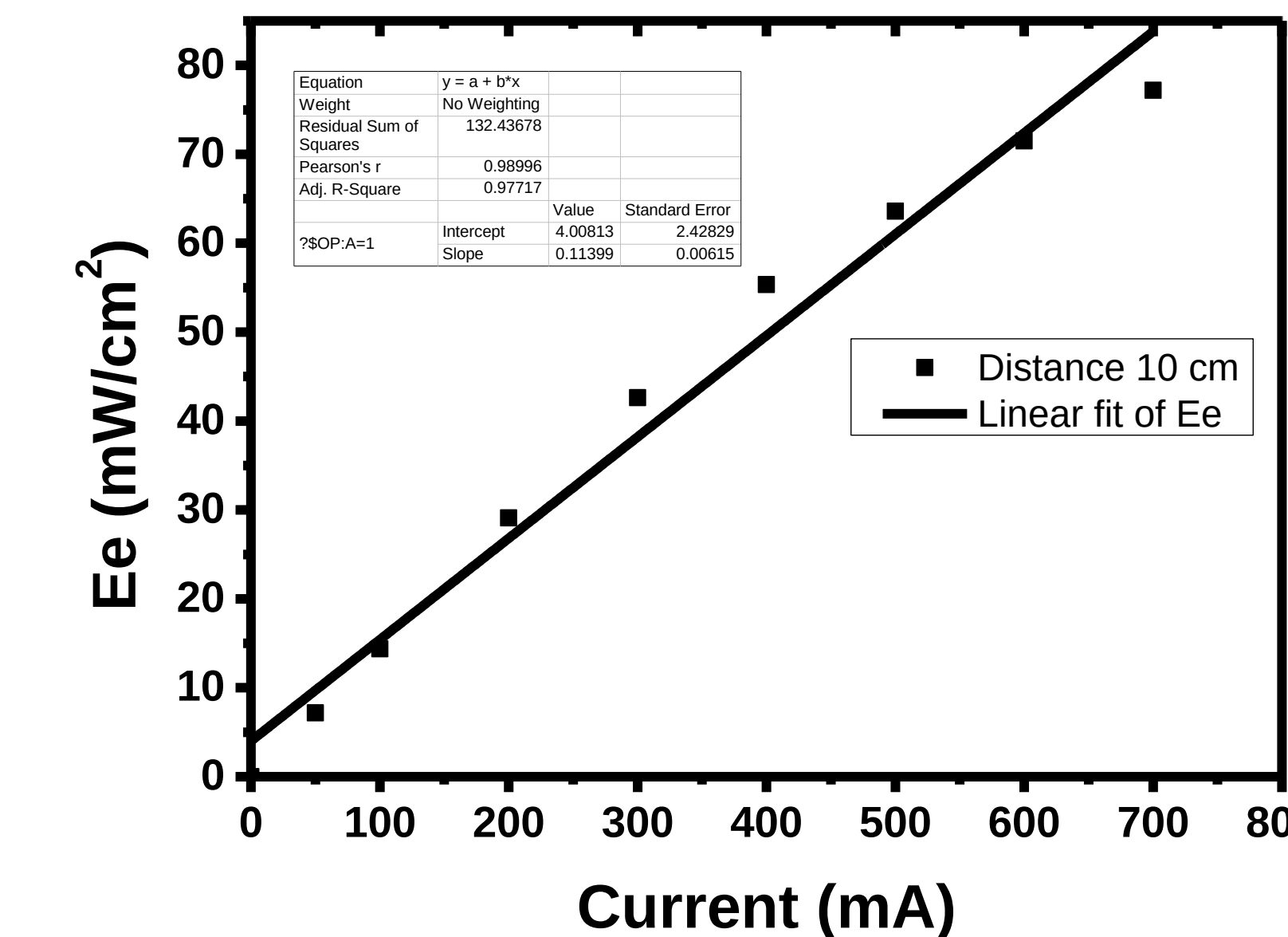
## The Solution



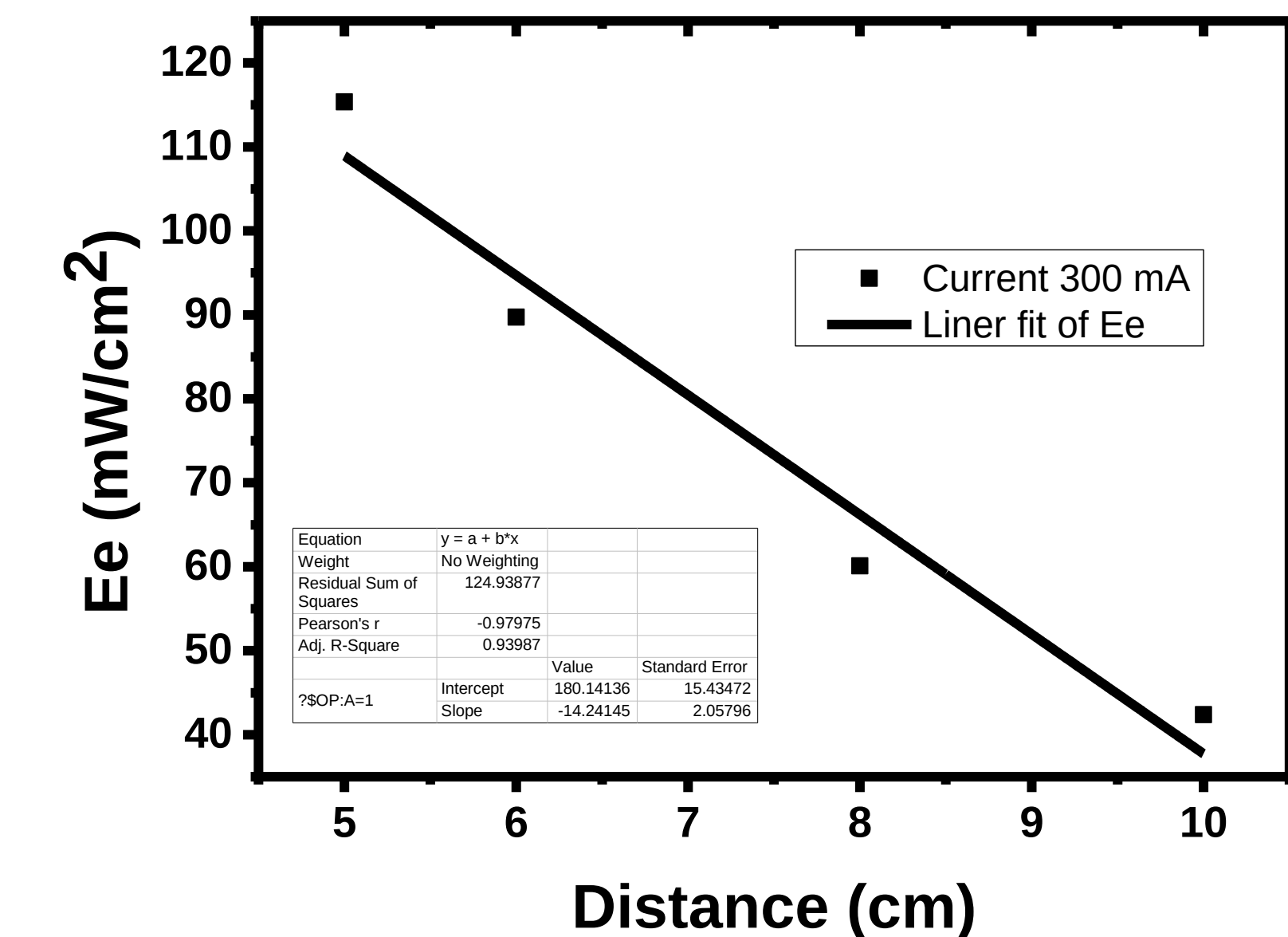
Proposed Light Source



Selectable Wavelengths

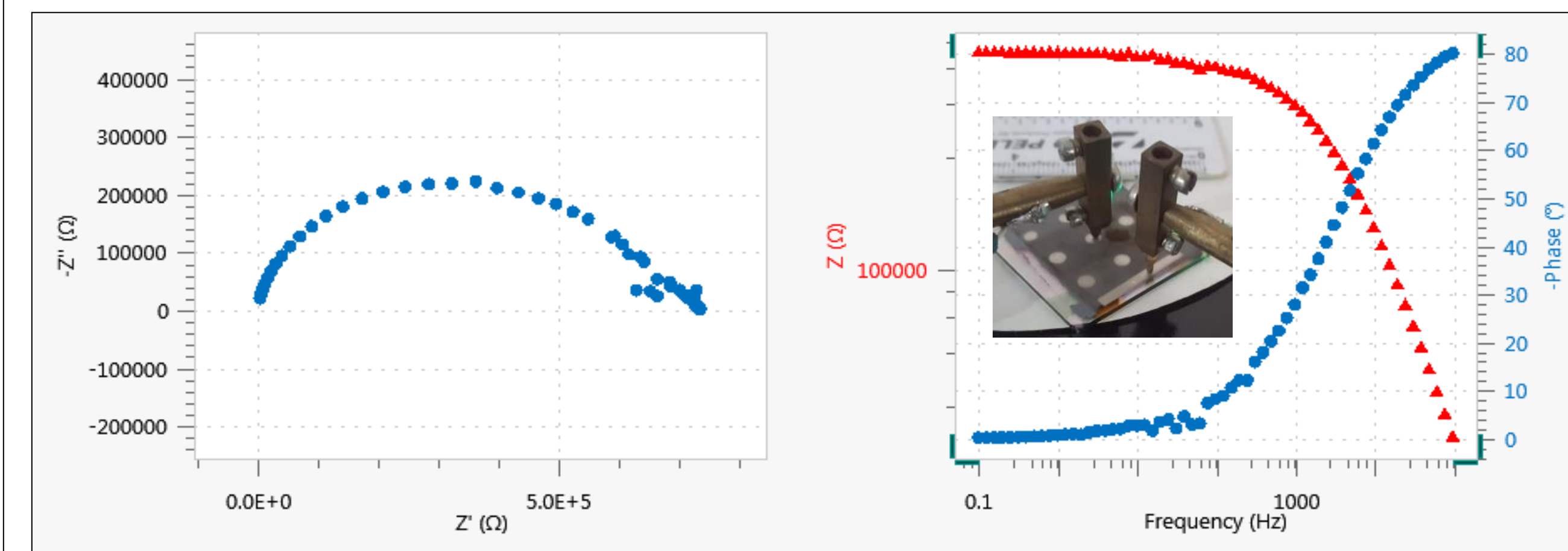


Adjustment of intensity by varying current

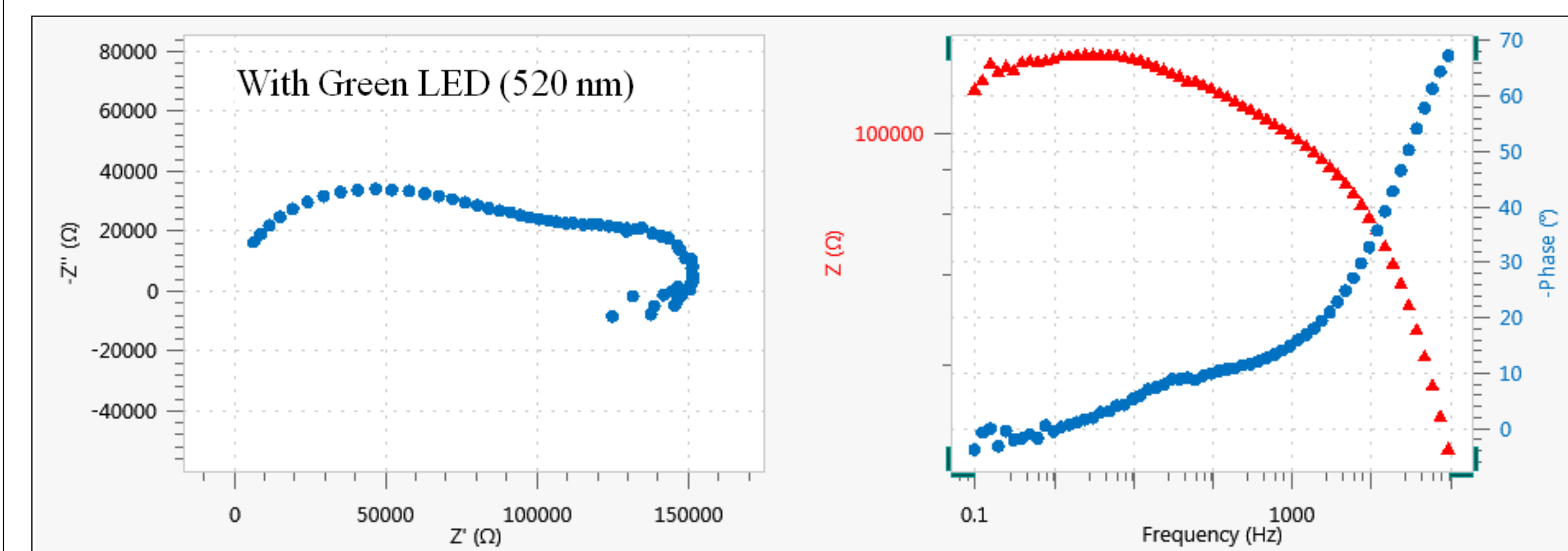


Adjustment of intensity by varying distance

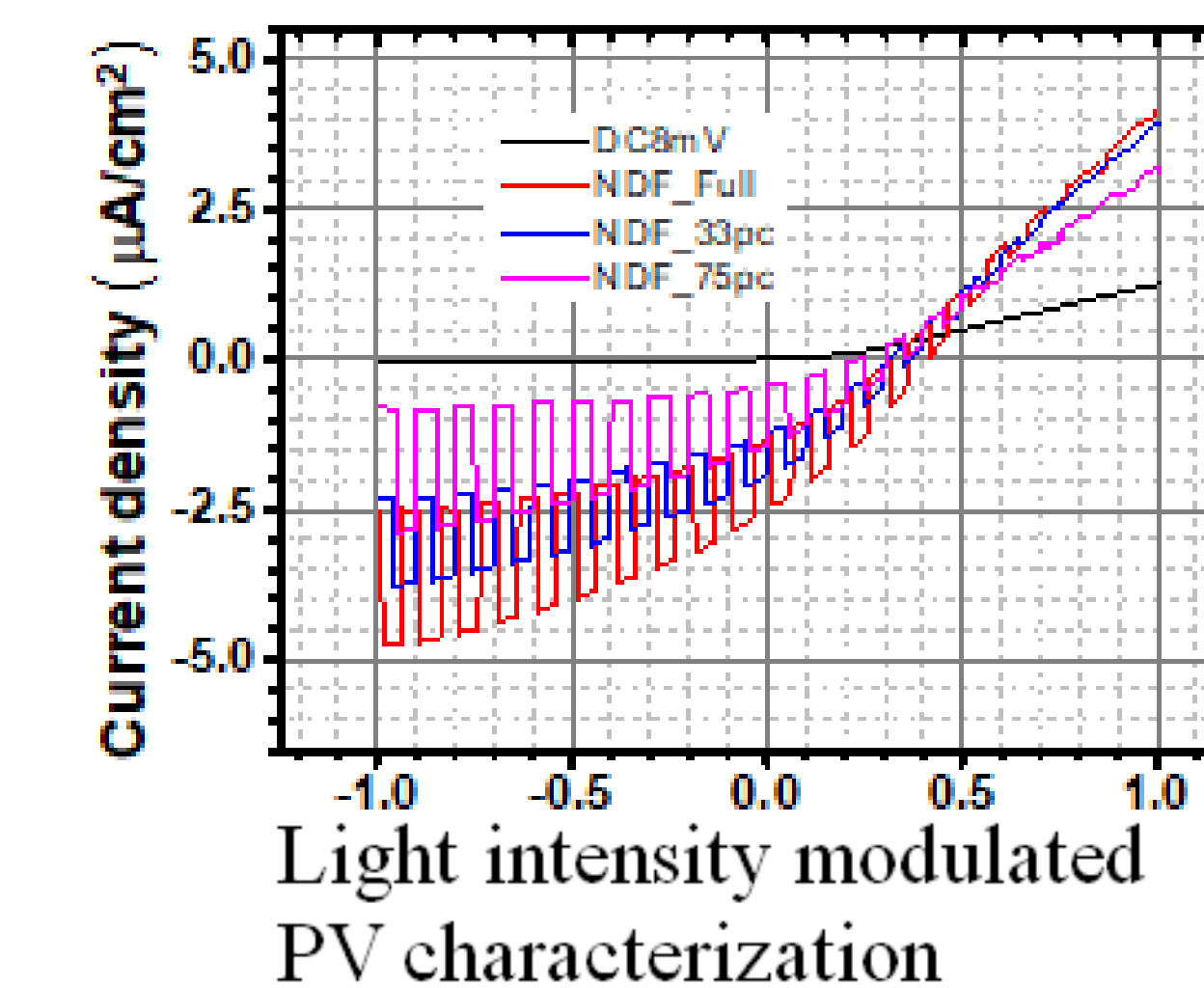
## Some Measurements



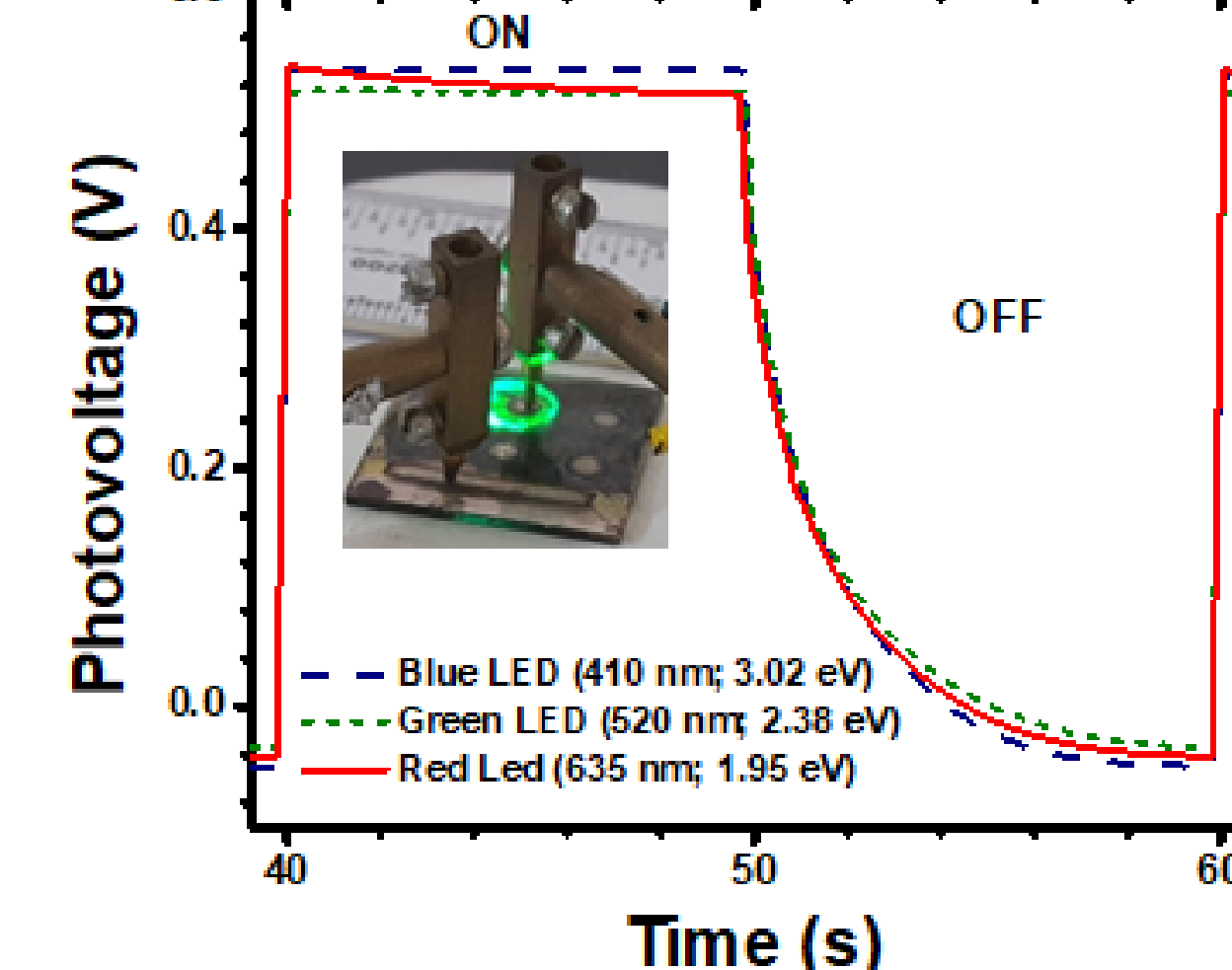
Light intensity modulated Impedance Spectroscopy with no illumination



Light intensity modulated Impedance Spectroscopy with 520 nm light

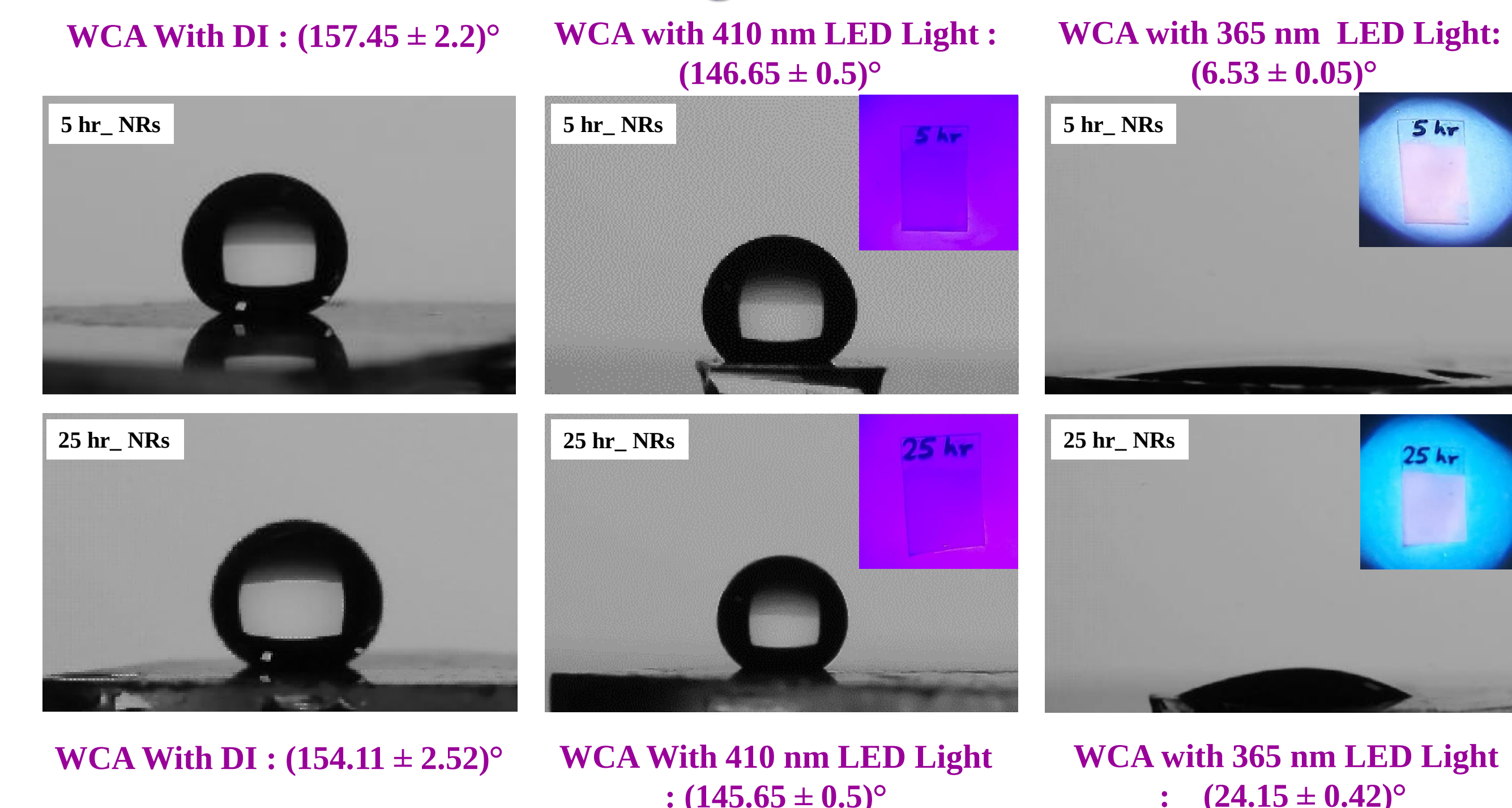


Light intensity modulated PV characterization



Photoresponse for different wavelength

### Contact Angle Of ZnO NRs



## Conclusion

The unique features which are not available in commercial light sources will enhance the advancement of renewable energy as well as other Photochemistry and Photophysics related researches.