

# IN OPERANDO OPTOELECTRONIC CHARACTERISATION OF PEROVSKITE SOLAR CELLS



Muhammad Okash Ur Rehman – Advisor: Prof. Dr. Antonio Abate

Curriculum: Ingegneria dei Materiali e delle Strutture

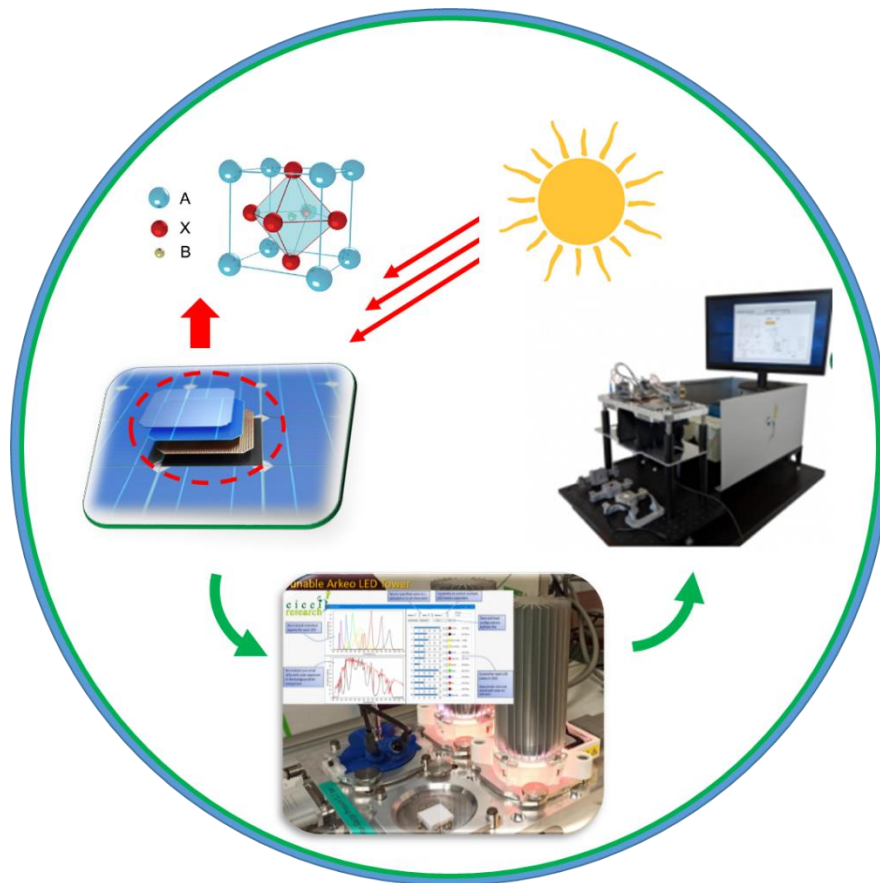


Figure: Graphical abstract

Solar energy is a significant renewable energy source to meet the planet's rapid energy demand. This resource has abundant energy and encourages a greener and clean atmosphere. The conversion of sunlight energy into electrical power is attained through photovoltaic (PV) cells. In recent years, perovskite solar cell (PSC) technology achieved remarkable attention in sustainable

energy in the laboratory and industry sectors. In 2009 PSCs were initially proposed as visible light sensitizers for PVs with 3.8% power conversion efficiency at the laboratory scale, to date, reached an extraordinary 25.7%. The PSC overcame the major drawback of silicon-based solar, i.e. high production cost; however, there is still a big challenge with their stability to be solved.

In operando optoelectronic characterisation refers to the study and investigation of PSC under operating conditions. This study will contribute to understanding their underlying mechanisms and identifying the factors that affect the stability and efficiency of the device. Current Voltage (I-V), External Quantum Efficiency (EQE), Maximum power point tracking (MPPT), Photoluminescence Spectroscopy and Impedance Spectroscopy are the most common optoelectronics characterisation techniques. These characterisation techniques, among others, provide valuable information about PSC's optical, electrical and electronic properties.

**Muhammad OkashUr Rehman**

**PhD student XXXVIII cycle, May 2023**

[muhammad.okashurrehman@unina.it](mailto:muhammad.okashurrehman@unina.it)

[Okasha.pu@gmail.com](mailto:Okasha.pu@gmail.com)