

## Appunti di Fisica '22

29 giugno ore 15:30

su Microsoft Teams "Seminari di Appunti di Fisica"

### Up-scaling of semi-transparent 3<sup>rd</sup> PV generation

**Jessica Barichello**

(CHOSE, Polo Solare Organico, Dipartimento di Ingegneria Elettronica, Università degli Studi di Roma 'Tor Vergata')

Semi-transparent solar cells have attracted attentions due to their promising use in several application rooms such as Building Integrated PhotoVoltaic (BIPV), tandem devices and wearable electronics. Semi-transparent solar cells could enable the Internet of Things (IoT) through self-powered electronic devices displays. Relevant metrics for transparent photovoltaics are the Power Conversion Efficiency (PCE) and the Average Visible Transmittance (AVT), along with the Color Rendering Index (CRI). Since Silicon PV dominates the market, in order to introduce an optical transparency of PV devices, it is necessary pointing towards alternative technologies to deliver a high Light Utilization Efficiency (LUE, i.e. PCE multiply by AVT) for solar cells.

In early nineties, the working mechanism of DSSC (Dye-Sensitized Solar Cell) has been discovered and they promised a smart fabrication process. Both peculiar feature of transparency and color tunability are suitable for a wide application in indoor environment, which is considered the future for DSSC technology once ultimately optimized the process for the up scaling of devices up to panels.

Moreover, Perovskite PhotoVoltaics - which has roots in DSSC - stands out as the ideal choice in this respect, due to an easy tunable bandgap and to a high PCE amongst the technologies belonging to the 3<sup>rd</sup> PV generation.

In order to enter the market, realizing large area modules and panels, a huge effort to modify the fabrication process is necessary to reach the demanding and mandatory goal of the scaling-up.

This seminar aims to present two projects: AQUAPONIC and CITY SOLAR regarding the DSSC and PCS respectively. In AQUAPONIC project, I am going to present the up-scaling process to fabricate a DSSC panel of 2 m<sup>2</sup> for a greenhouse application. In CITY SOLAR project, I am going to present both the color tunability of PSC and the modification of the fabrication process needed to realize an A4 shape semi-transparent module.