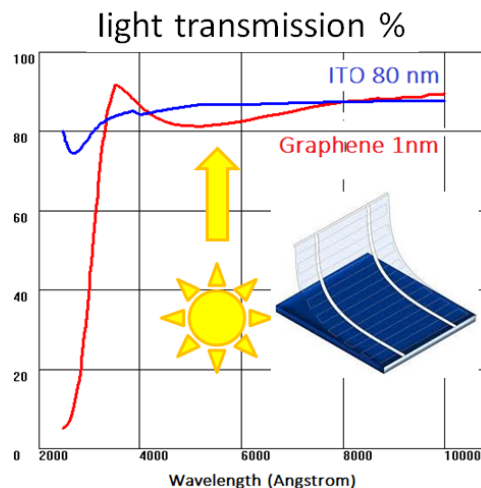


Raw Elements Substitution in electronic, optoelectronic and photovoltaic technologies



A. Main topics

- Indium Thin Oxide (ITO) substitution by Graphene
- (natural) Organic semiconductors for PhotoVoltaic applications: OPV

B. Targeted audience

14-19 year old students

C. Key concepts

1. *How it's made*: transparent electrodes in everyday-life devices (touch screens, flat panel screens, LEDs, solar cells).
2. *New possibilities beyond Indium Thin Oxide (ITO) substitution*: use of graphene in flexible electronics.
 - Explication by linking with the school programme (e.g. insulators, conductors and ohm law); experimental activity
3. *Organic solar cells*: flexible, lightweight, semi-transparent, ecofriendly and printable devices for a new generation of solar cells. OPV will not replace traditional PV, but instead will create new markets and applications where its unique properties are fully valued.
 - Explication with a power point presentation followed by an experimental activity: preparation of an organic solar cell.

D. Experimental activity

Two experiences can be performed in the classroom/lab by the students themselves :

- observation of current flowing through transparent glasses and plastics coated either by ITO or by graphene
- preparation of dye sensitized solar cells using blueberry juice as sensitizer

E. Toolkit material

- For the experiment on transparent electrodes: glass and plastic samples coated either with ITO or with graphene; a graphite-tip pencil and one uncoated glass sample; a circuit made up of a battery, an LED and one of the coated samples to be assembled by the students.
- For the experiment on solar cell preparation: two conductive glasses; a precursor of titania, an hot-plate, a bottle of blueberry juice, and a solution of I/I_3 as electrolyte; 3 pipettes, 2 pins;
- circuit with an LED to be assembled by the students; sunlight or an halogen lamp
- Protocol with the description of the two experiments
- Pedagogical dossier with explications, pictures, etc. that can be used by the teacher
- A video will be released after optimization with the pilot schools

F. RM Tutors

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