

# CuGaO<sub>2</sub> a promising alternative for NiO in p-type dye solar cells

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## Experimental details

### *Electrochemical impedance spectroscopy (EIS) measurements.*

Pellets for electrochemical impedance spectroscopy (EIS) measurements were formed from CuGaO<sub>2</sub> nanoparticles pressed under 100 bars and sintered at 450°C for 3 hours in nitrogen atmosphere. The back side was painted with a silver glue and contacted with copper coil before being mounted in a polypropylene tube using chemically resistant epoxy. EIS measurements were carried out with a potentiostat/galvanostat model VSP from Biologic Sciences Instruments on polished samples (used SiC-Paper, grit 1200 and 4000 (Struers)) in an electrolyte composed of 1 M LiClO<sub>4</sub> in water (pH ~ 6.3) with a platinum counter-electrode and a saturated calomel reference electrode (SCE).

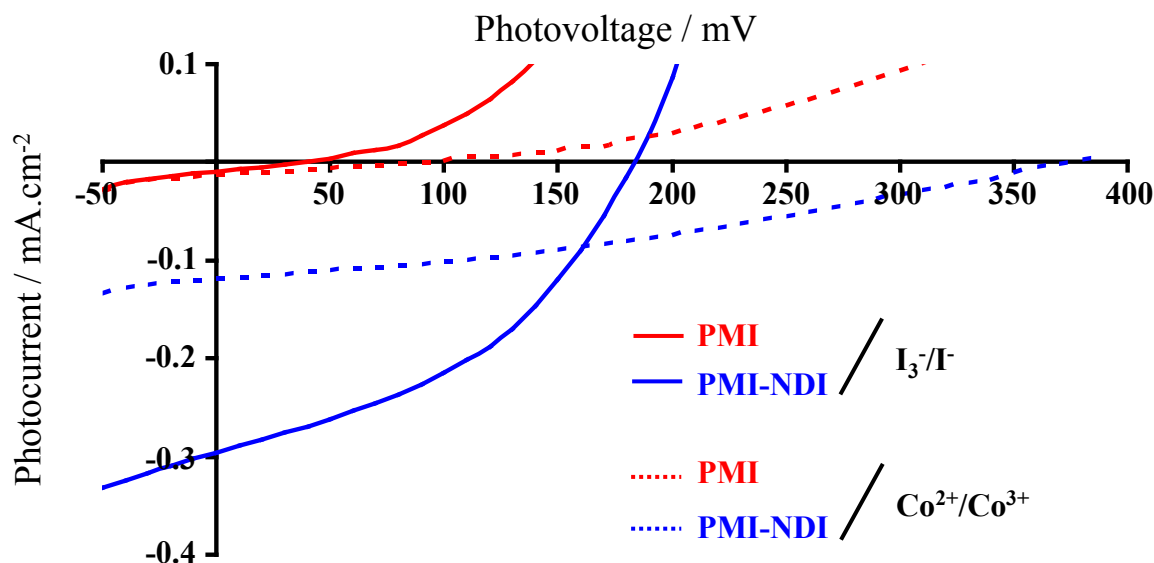
*Preparation of the CuGaO<sub>2</sub> photocathode.*

The doctor Blade paste is composed of CuGaO<sub>2</sub> nanoparticles ball milled in an adapted mixture of organic ingredients to have a suitable rheology to homogeneously spread CuGaO<sub>2</sub> on FTO (Solems 10 Ohm TEC7) (see table S1).

**Table S1.** Detailed composition of the paste for doctor blading.

	Component	Quantity
<b>Semiconductor</b>	CuGaO <sub>2</sub>	100 mg
<b>Binder</b>	PEG 300 (Aldrich)	20.5 mg
<b>Rheological agent</b>	Ethylcellulose (Aldrich)	4 mg
<b>Acidifying agent</b>	4-hydrobenzoic acid (Merck)	2 mg
<b>Solvent</b>	2-ethyl-1-hexanol (Aldrich)	750 μL

The as-obtained electrodes were then dipped at room temperature for 48 hours into an acetonitrile solution, containing either perylene monoimide (PMI) or perylene monoimide sensitizer connected to a naphthalene diimine electron acceptor (dyad PMI-NDI). The dyed electrodes were thoroughly rinsed with acetonitrile.



**Fig. S1.** Photoresponse under AM1.5 illumination (1000 W/m<sup>2</sup>) of solar cells constructed from CuGaO<sub>2</sub> p-SC with dyad PMI-NDI or PMI as sensitizer, and I<sub>3</sub><sup>-</sup>/I<sup>-</sup> or Co<sup>2+</sup>/Co<sup>3+</sup> in PC as redox mediator.