Sisteme de caracterizare a celulelor fotovoltaice si generatoarelor termoelectrice in lumina naturala si concentrata

Prof. Dr. Ing. Cotfas Daniel Tudor
dtcotfas@unitbv.ro
Prof. Dr. Ing. Cotfas Petru Adrian
pcotfas@unitbv.ro

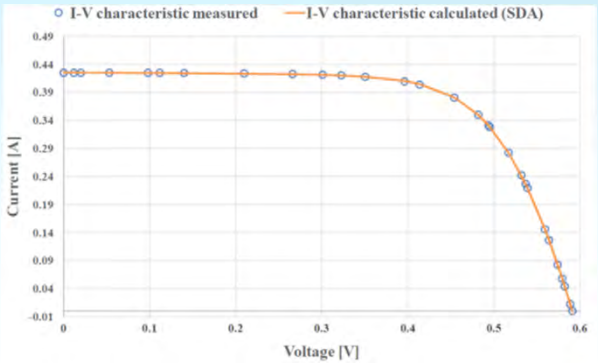
Universitatea Transilvania din Brasov

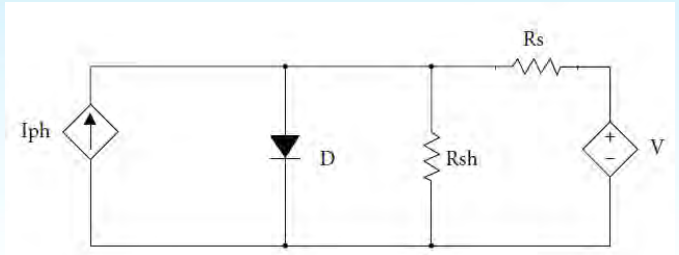
Sumar

- Sisteme de caracterizare in laborator
- Sisteme de caracterizare mobile
- Sisteme de caracterizare pt lumina concentrata

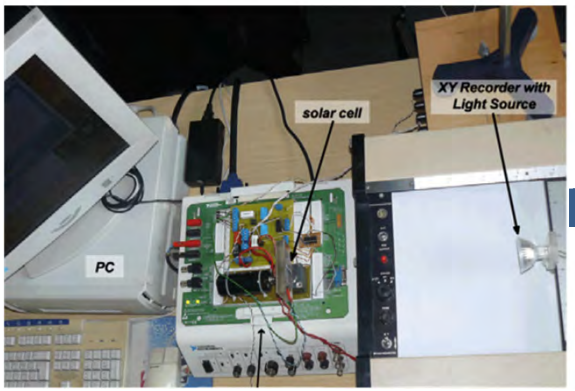
Sisteme de caracterizare in laborator

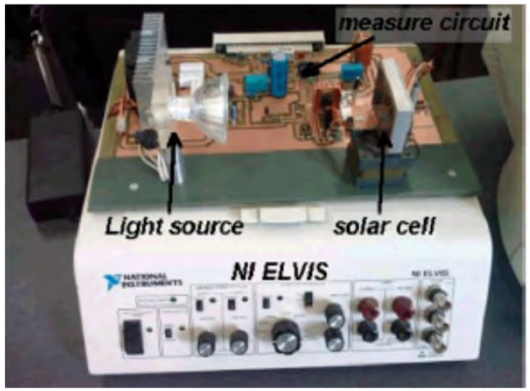
$$I = I_{ph} - I_o\left(e^{\frac{V+IR_s}{nV_T}} - 1\right) - \frac{V+IR_s}{R_{sh}}$$





RELab

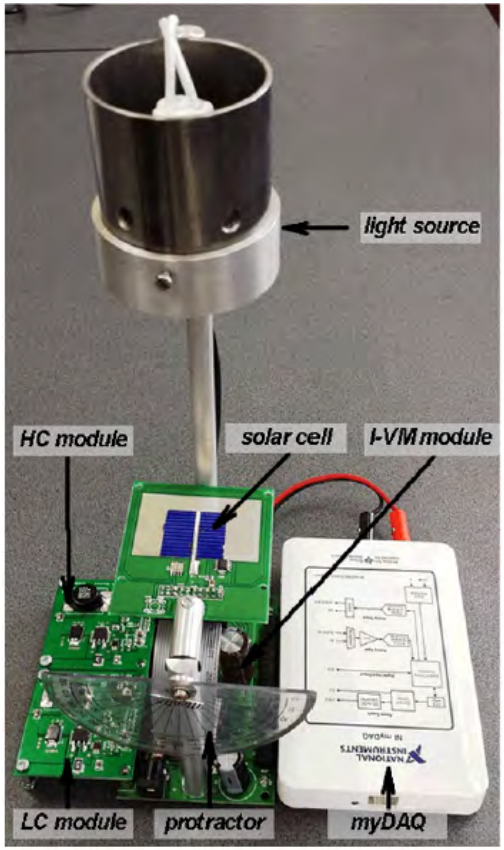

solar cell
XY Recorder with Light Source
PC


measure circuit
Light source
solar cell
NI ELVIS


NI ELVIS
LC module
HC module
I-VM module
SC module
Stepper motor
Light source
solar cell

RELab cu Simulator clasa AAA

Sisteme de caracterizare mobile



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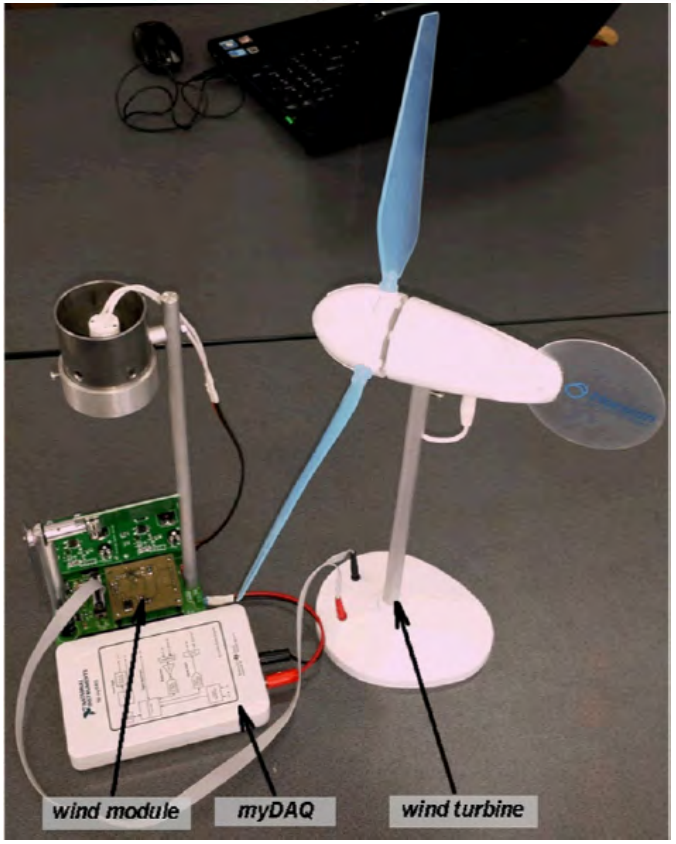
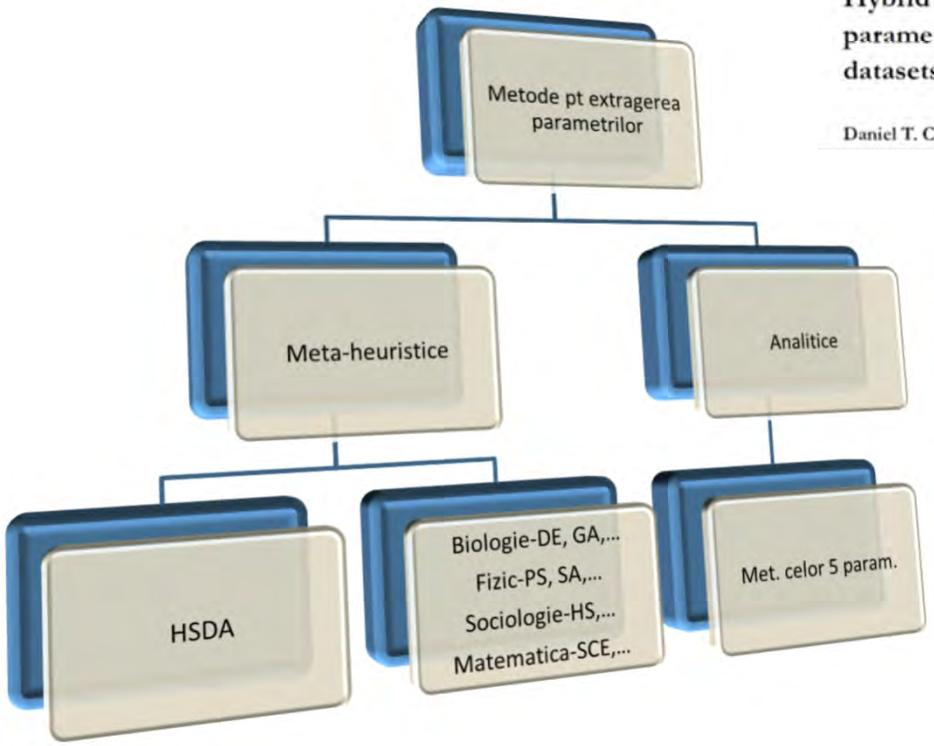


Metode



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ORIGINAL RESEARCH PAPER

Hybrid successive discretisation algorithm used to calculate parameters of the photovoltaic cells and panels for existing datasets

Daniel T. Cotfas[1] | Adrian M. Deaconu[2] | Petru A. Cotfas[1]

Energy Conversion and Management 196 (2019) 545–556

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Application of successive discretization algorithm for determining photovoltaic cells parameters

Daniel T. Cotfas[a,*], Adrian M. Deaconu[b], Petru A. Cotfas[a]

[a] Department of Electronics and Computers, Transilvania University of Brasov, Eroilor 29, 500036 Brasov, Romania
[b] Department of Mathematics and Computer Sciences, Transilvania University of Brasov, Eroilor 29, 500036 Brasov, Romania

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Hindawi

Review Article

Analytical versus Metaheuristic Methods to Extract the Photovoltaic Cells and Panel Parameters

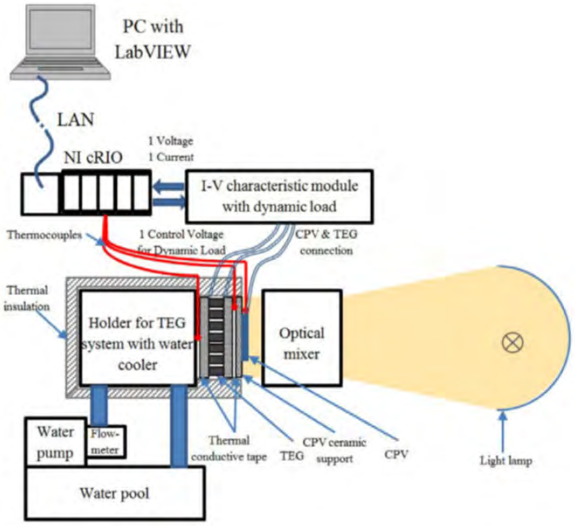
Daniel T. Cotfas, Petru A. Cotfas, Mihai P. Oproiu, and Paul A. Ostafe

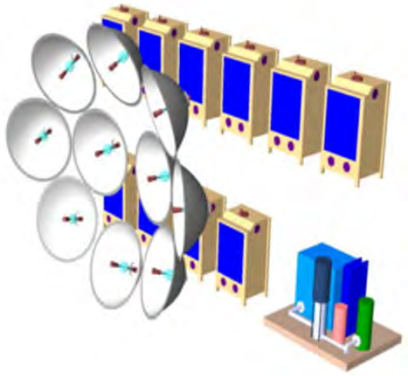
Caracterizarea PV in lumina concentrata

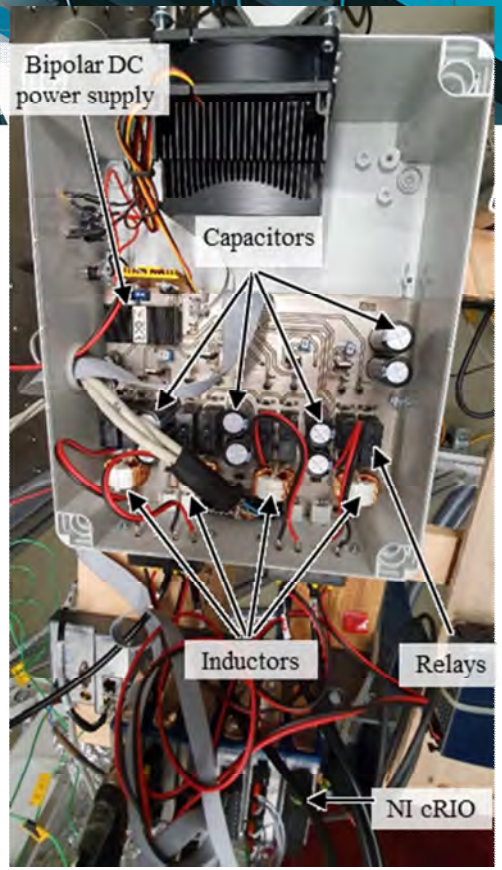
- in cadrul proiectelor SFERA I, II si III s-au studiat PV si sistemele hibride in lumina concentrata
- Granturi de acces la facilitatile de cercetare:
  - 2 x Solar Research Facility Unit, Weizmann Institute of Science, Rehovot, Israel
  - 4 x Solar Technologies Laboratory, Paul Scherrer Institute (PSI), Villigen, Elveția
  - 3 x Synlight facilty, DLR Institute of Solar Research, Jülich, Germany
  - 2 x Very High Concentration Solar Tower and High Flux Solar Simulator, IMDEA ENERGY, Madrid, Spain

Sisteme de caracterizare in lumina concentrata

- Dezvoltare in jurul platformei NI cRIO
  - Patru canale independente si sincrone (DC si AC)





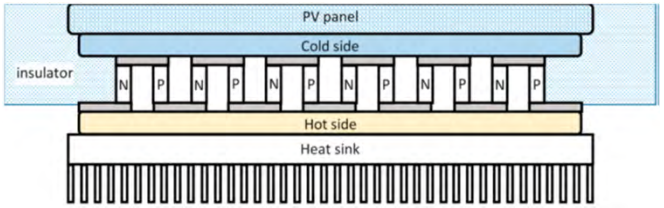


S. Mahmoudinezhad, S. Ahmadi Atouei, P.A. Cotfas, D.T. Cotfas, L.A. Rosendahl, A. Rezania, Experimental and numerical study on the transient behavior of multi-junction solar cell-thermoelectric generator hybrid system, Energy Conversion and Management, vol 184, 2019, https://doi.org/10.1016/j.enconman.2019.01.081

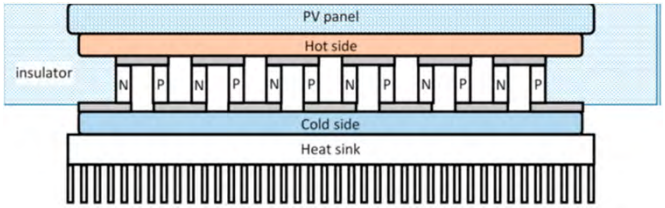
P. A. COTFAS, D. T. COTFAS and S. SPATARU, "Study of photovoltaic cell degradation under rapid light variation," 2020 5th International Conference on Smart and Sustainable Technologies (SpliTech), 2020

Sisteme de caracterizare in lumina concentrata

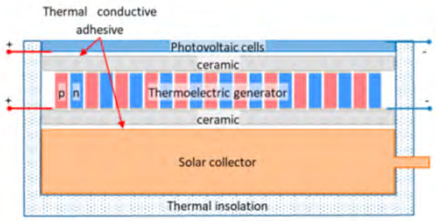
- Tipuri de sisteme hibride caracterizate



Photovoltaic–thermoelectric cooler (PV-TEC) structure

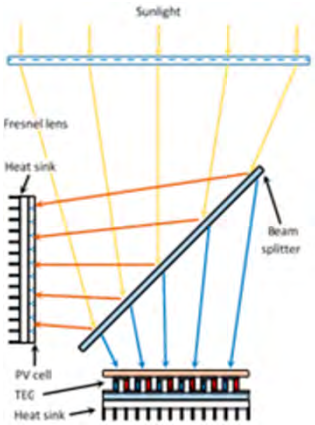


PV–thermoelectric generator (PV-TEG) structure



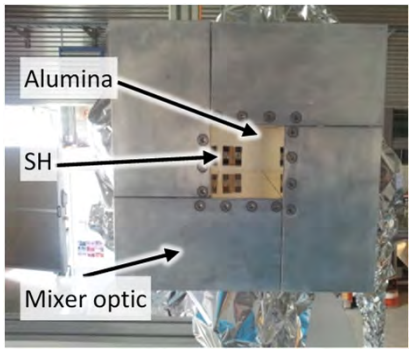
PV-TEG-T structure

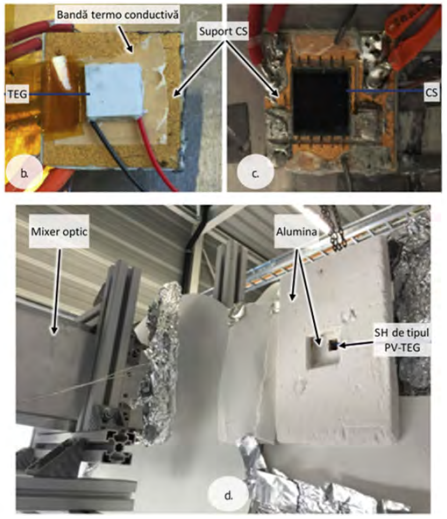
PV-TEG indirectly coupled structure with beam splitter

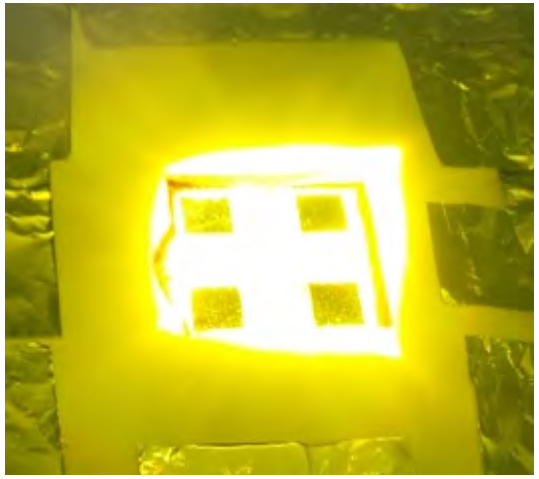


Sisteme de caracterizare in lumina concentrata

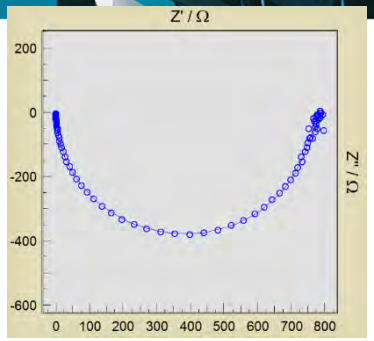
- Tipuri de sisteme caracterizate







Caracterizarea PV in domeniul AC

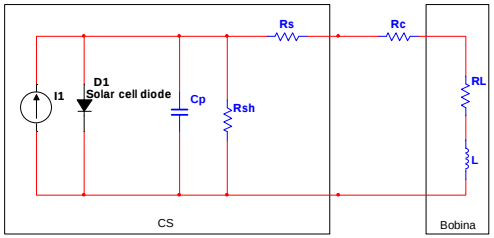


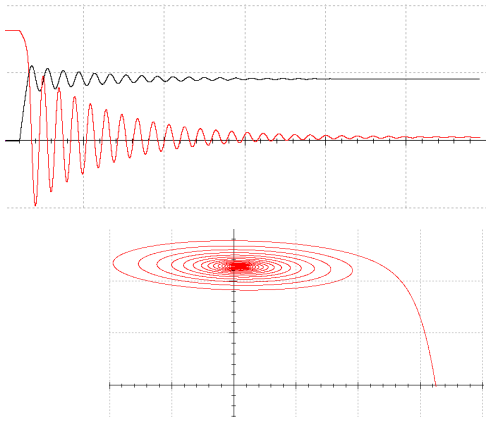
- Parametrii dinamici pot oferi informații despre calitatea și starea de degradare a CS
- Metoda spectroscopiei de impedanță – cea mai utilizată:

$$Z = \frac{E_0 \sin\left(\omega t + \varphi_E\right)}{I_0 \sin\left(\omega t + \varphi_I\right)}$$

- O metodă mai simplă este cea bazată pe formarea unui circuit rezonant de tip RLC la conectarea unei bobine de inductanță L la bornele unei CS:

$$C_p = \frac{1}{L\left(\omega^2 + \left(\frac{\omega\Delta}{2\pi}\right)^2\right)}$$





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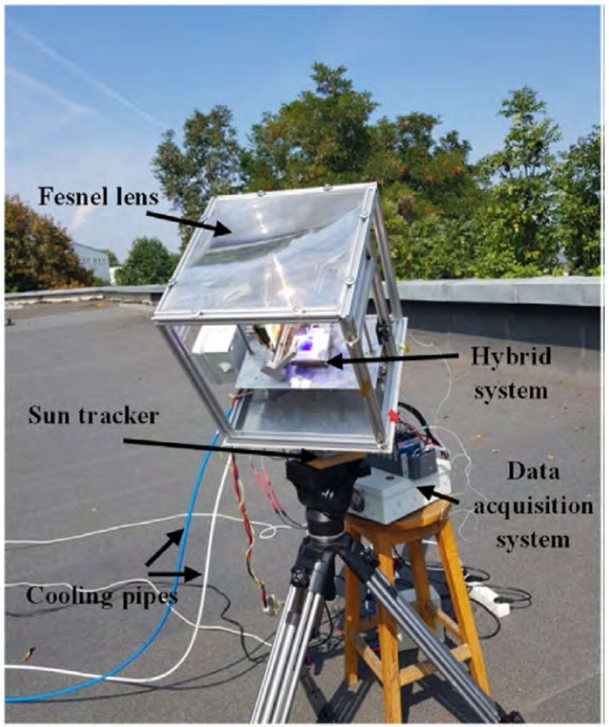
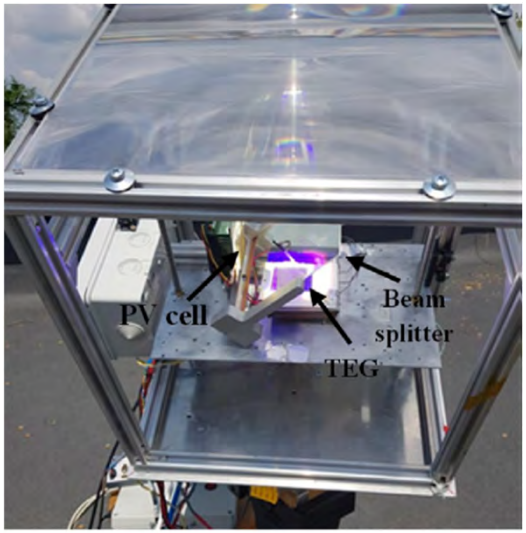
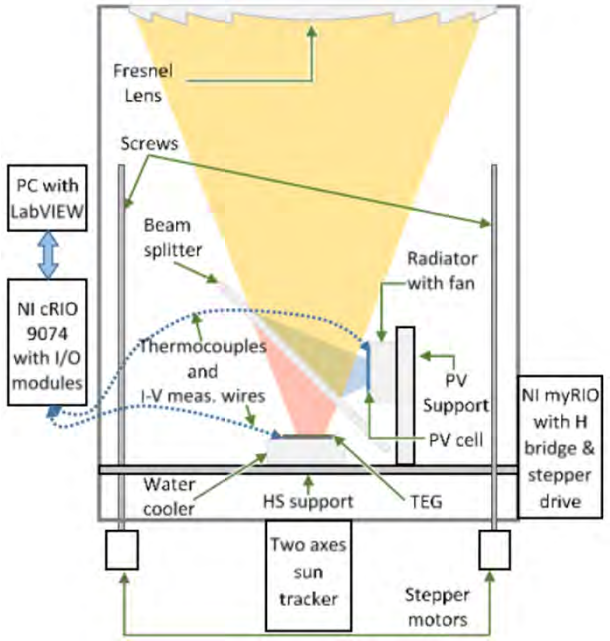
Solutie proprie de concentrare a luminii







1. Mahmoudinezhad, Sajjad, Petru A. Cotfas, Daniel T. Cotfas, Enok J.H. Skjølstrup, Kjeld Pedersen, Lasse Rosendahl, and Alireza Rezania, "An Experimental Study on Transient Response of a Hybrid Thermoelectric–Photovoltaic System with Beam Splitter" Energies 14, no. 23, 2021
2. S. Mahmoudinezhad, D.T. Cotfas, P.A. Cotfas, Enok J.H. Skjølstrup, K. Pedersen, L. Rosendahl, A. Rezania, Experimental investigation on spectrum beam splitting photovoltaic–thermoelectric generator under moderate solar concentrations, Energy, Vol 238, Part C, 2022.

Mul tuMiM Pent ru A tent ie!

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