To: Energy Editorial Board
Subject: Article Submit

Dear Editors,

Enclosed with this letter you will find the electronic submission of manuscript entitled "Estimation of parameters for solar cells with S–shaped current–voltage characteristics using meta–heuristic algorithms" O. Olikh.

This is an original paper which has not been simultaneously submitted as a whole or in part anywhere else. No conflict of interest exits in the submission of this manuscript.

It is well known that identifying the parameters of photovoltaic (PV) models based on measured current-voltage (IV) characteristic curves is crucial for simulating, evaluating, and controlling PV systems. IV characteristics of new-generation PV devices, including thin-film, organic, perovskite, and quantum dot solar cells, often demonstrate an S-shaped deformation. Hence, accurately estimating parameters from S-shaped IV curves is of utmost importance. No Free Lunch theory states that no single meta–heuristic algorithm can solve all optimization tasks effectively. This study aimed to compare the effectiveness of parameter estimation according to the opposed two-diode model using a set of 14 meta-heuristic algorithms and determine the best-performing among them. The obtained results are compared using various nonparametric statistical methods. We believe that this work of testing and comparative analysis of different meta-heuristic algorithms for the estimation of solar cell parameters would be of interest to the readers.

We would very much appreciate if you would consider the manuscript for publication in the *Energy*.

Sincerely yours,
Oleg Olikh
Taras Shevchenko National University of Kyiv
Kyiv 01601, Ukraine
E-mail: olegolikh@knu.ua