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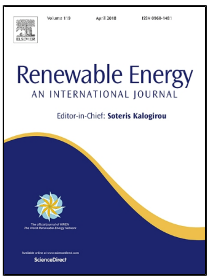

A novel bibliometric-based technique to identify emerging photovoltaic technologies in a comparative assessment with expert review.

Alberto Moro, Elisa Boelman, Geraldine Joanny, Juan Lopez Garcia

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A novel bibliometric-based technique to identify emerging photovoltaic technologies in a comparative assessment with expert review.

Alberto Moro[a], Elisa Boelman[a], Geraldine Joanny[a], Juan Lopez Garcia[a]

[a] European Commission, Joint Research Centre, via Enrico Fermi 2749, Ispra, Italy

E-mail addresses: alberto.moro@ec.europa.eu; elisa.boelman@ec.europa.eu; geraldine.joanny@ec.europa.eu; juan.lopez-garcia@ec.europa.eu

Corresponding author: Alberto Moro, E-mail: alberto.moro@ec.europa.eu

Abstract

This paper compares the results of technology mapping from bibliometric analysis and results from expert review to identify emerging solar photovoltaic (PV) technologies. The bibliometric analysis is based on "Tools for Innovation Monitoring" (TIM), a new software code developed by the Joint Research Centre. With this text-mining software a set of relevant keywords is extracted through frequency analysis from a corpus of pertinent scientific publications. Keywords obtained by quantitative analysis by TIM are tested against results from qualitative cognitive analysis by an international panel of PV technology experts by means of a set of proposed indicators. The technologies identified by the PV experts are well represented amongst the most frequently occurring (highest ranked) keywords retrieved by TIM. The more salient keywords tend to correspond to the relatively more established technologies such as dye sensitised solar cells, organic PV and more recently-developed technologies such as perovskites. These high rated/developed keywords/technologies can be relatively straightforwardly detected through bibliometric analysis. Contrary to that, keywords designating the most emerging technologies like ferroelectric PV, hot carriers and multiple exciton generation solar cells tend to occur much less frequently and therefore provide weaker signals. These weak signals can be important in foresight.

Keywords: Bibliometrics; Technology mining; Emerging technologies; Photovoltaics; Horizon scanning; Policy support.

Highlights:

- Emerging PV technologies are identified by keyword analysis using TIM software
- A parallel expert review exercise was conducted as a reference
- Simple indicators to compare bibliometrics with expert review results are introduced
- Most (63%) technologies identified by experts are in the best 300 ranked by TIM
- This software requires 10% of the time and costs necessary to run the expert review