

Annie Hayeas 52 Farmers' Lane West Wareham

To the Planning Board regarding expertise in the areas of leaching potential from photovoltaic modules and of lithium ion battery storage in pursuit of best safeguards for Wareham's citizens' health, safety and welfare embodied by the protection of our land, air and water.

I have submitted the research of Stuttgart University scientists led by Jurgen Werner in the past. The following are the initial leaching report, the response by Sinha and Wade, employed by First Solar and the final rebuttal to their assertions by the Stuttgart scientists.

Dr. Werner was also elected as editor in chief of Solar Magazine.

I have emailed Dr. Werner to attempt additional information.

Prof. Dr. Jürgen Werner, Universität Stuttgart, Institut für

Photovoltaik, Tel. 0711/685-67141,

E-Mail: juergen.werner (at) ipv.uni-stuttgart.de

Prof. Jörg Metzger, Universität Stuttgart, Institut für

Siedlungswasserbau, Wassergüte- und Abfallwirtschaft, Tel.

0711/685-63721, E-Mail: joerg.metzger (at) iswa.uni-stuttgart.de

Andrea Mayer-Grenu, Universität Stuttgart, Abt.
Hochschulkommunikation, Tel. 0711/685-82176,
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Expert Juergen Werner

Dr. Werner's background as announced by Solar Magazine.

<https://www.mdpi.com/about/announcements/2947>

Name:

Jürgen Heinz Werner

Academic title:

Prof. Dr. rer. nat. Dr. rer. nat. habil.

Affiliation: Institute for Photovoltaics and Research Center SCoPE, University of Stuttgart, 70569 Stuttgart, Germany

Homepage: <https://www.ipv.uni-stuttgart.de/institut/team/Werner-00009/>

Research fields: semiconductor interfaces; photovoltaics; renewable energies

1980 Diploma Degree in Physics, University of Tübingen

1983 Ph.D. at Max-Planck-Institute for Solid State Research, Stuttgart

1983–1985 Postdoc at Max-Planck-Institut for Solid State Research, Stuttgart

1985–1987 Postdoc at IBM T.J. Watson Research Center, Yorktown Heights, N.Y., and at AT&T Bell Laboratories, Murray Hill, N.J., USA

1991 Habilitation at Technical University of Munich

1987–1996 Permanent member of staff at Max-Planck-Institute for Solid State Research, Stuttgart

1996–2020 Full professor and director of Institute for Photovoltaics (until 2011: Institute for Physical Electronics), University of Stuttgart

2008–2018

Guest professor at Tokyo Institute of Technology, Tokyo, Japan

2016–2018

Guest professor at Tokyo City University, Tokyo, Japan

The screenshot shows a web browser window displaying the MDPI Solar journal editorial board page. The browser's address bar shows the URL [mdpi.com/journal/solar/editors](https://www.mdpi.com/journal/solar/editors). The page features a sidebar on the left with the 'solar' logo and navigation links such as 'Submit to Solar', 'Review for Solar', and 'Menu'. The main content area is titled 'Editorial Board' and includes a note about the alphabetical order of editors. Below this, there is a search bar and a list of three members: Prof. Dr. Jürgen Heinz Werner (Editor-in-Chief), Dr. Loreto Valenzuela (Associate Editor-in-Chief), and Dr. Sadia Ameen (Editorial Board Member). Each member's entry includes a profile picture, name, title, affiliation, and a list of interests.

solar

Submit to Solar

Review for Solar

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Browser


Editorial Board

Please note that the order in which the Editors appear on this page is alphabetical, and follows the structure of the editorial board presented on the MDPI website under information for editors: **editorial board responsibilities**.

Members (34)

 **Prof. Dr. Jürgen Heinz Werner** Website
Editor-in-Chief
Institute for Photovoltaics and Research Center SCoPE, University of Stuttgart, 70569 Stuttgart, Germany
Interests: solar cells; photovoltaics; renewable energy; energy storage; energy conversion; solid-state electronics; semiconductor junctions; opto- and microelectronic materials
Special Issues, Collections and Topics in MDPI journals

 **Dr. Loreto Valenzuela** Website
Associate Editor-in-Chief
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Interests: solar energy; solar thermal energy; solar power plants; parabolic trough; Fresnel reflectors; solar process heat
Special Issues, Collections and Topics in MDPI journals

 **Dr. Sadia Ameen** Website
Editorial Board Member
Advanced Materials and Devices Laboratory, Department of Bio-Convergence Science, Advance Science Campus, Jeonju National University, Jeonju 56212, Republic of Korea

2. Article- Leaching Via Weak Spots in Photovoltaic Modules (relevant to cd/te and all modules)

<https://www.mdpi.com/1996-1073/14/3/692>

Revised Jan 2021

Leaching via Weak Spots in Photovoltaic Modules



by

Jessica Nover ,



Renate Zapf-Gottwick 1,



Carolin Feifel 2



Michael Koch and



Juergen Heinz Werner



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Energies **2021**, *14*(3), 692; <https://doi.org/10.3390/en14030692>

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(This article belongs to the Special Issue **Solar Cells and Modules: Fabrication, Characterization, and Environmental Issues**)

Download

(EXCERPT)

Total separation: **Figure 3a–d** shows photographs of the front and the rear side of a 5 × 5 cm

2

2 CdTe module piece before and after 1.5 years of leaching. Before leaching the CdTe module piece, the integrated series connection of the cells is visible (see the horizontal lines) on the front side (**Figure 3a**) and also on the rear side (**Figure 3b**). On the rear side, one sees also the solder ribbon. Only the rear side glass of the module piece shows cracks caused by the water jet cutting. The breakage pattern of this glass indicates that heat-strengthened glass is used as the rear side glass. **Figure 3c,d** shows the front and the rear side of a CdTe module piece after the leaching process of 1.5 years in solutions with pH 3. Apart from a few parts, the module material disappeared completely. The solder ribbon is still attached to the rear side glass by an insulating tape. After this long-term leaching, the front and the rear side glasses are no

longer connected to each other, but totally separated. For a-Si module pieces, the same type of delamination is observed.

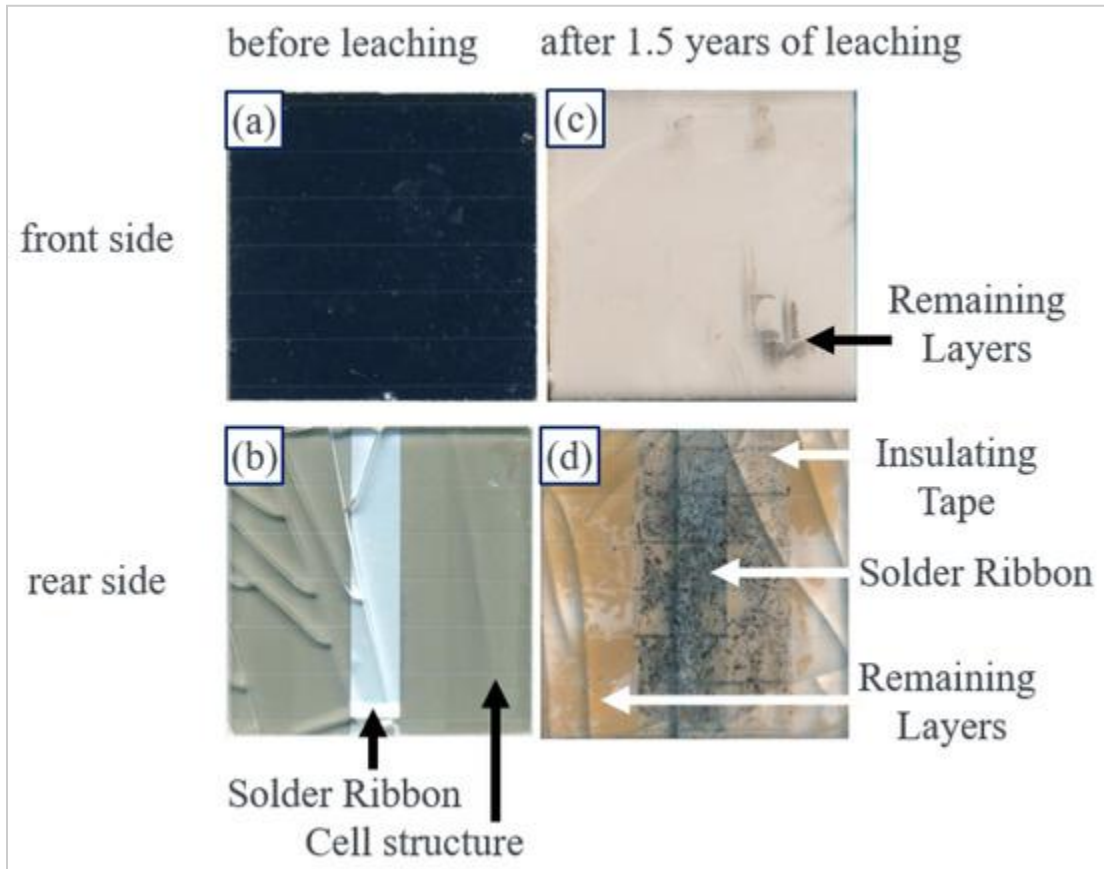


Figure 3. Photographs of (a) the front and (b) the rear side of a 5 × 5 cm

2

2 CdTe module piece before leaching. On the rear side, the solder ribbon and the interconnection of cells are visible. (c) Front side of the module piece after leaching over 1.5 years in solutions with pH 3. Apart from a few visible remaining parts, the module material disappeared. (d) Rear side of the module piece after the leaching. The solder ribbon with the insulating tape is visible and also some parts of remaining layers. After 1.5 years of leaching, the front and the rear side glasses are no longer attached to each other; total separation occurs.

Fractional separation:Figure 4a–d shows photographs of the front and the rear side of a 5 × 5 cm

2

2 CIGS module piece before and after 1.5 years of leaching: parts of the rear side are separated. Both glasses, the front and the rear side glass, show cracks due to the water jet cutting. **Figure 4c** shows a photograph of the front side after 1.5 years of leaching in solutions with pH 3. From the front side, a few transparent spots around the edges are visible. From a more detailed look at the back side of the module piece (**Figure 4d**), it becomes clear that at the transparent spots, parts of the rear side glass are missing, together with the back contact and the active module layers. Therefore, only the transparent front glass remains.

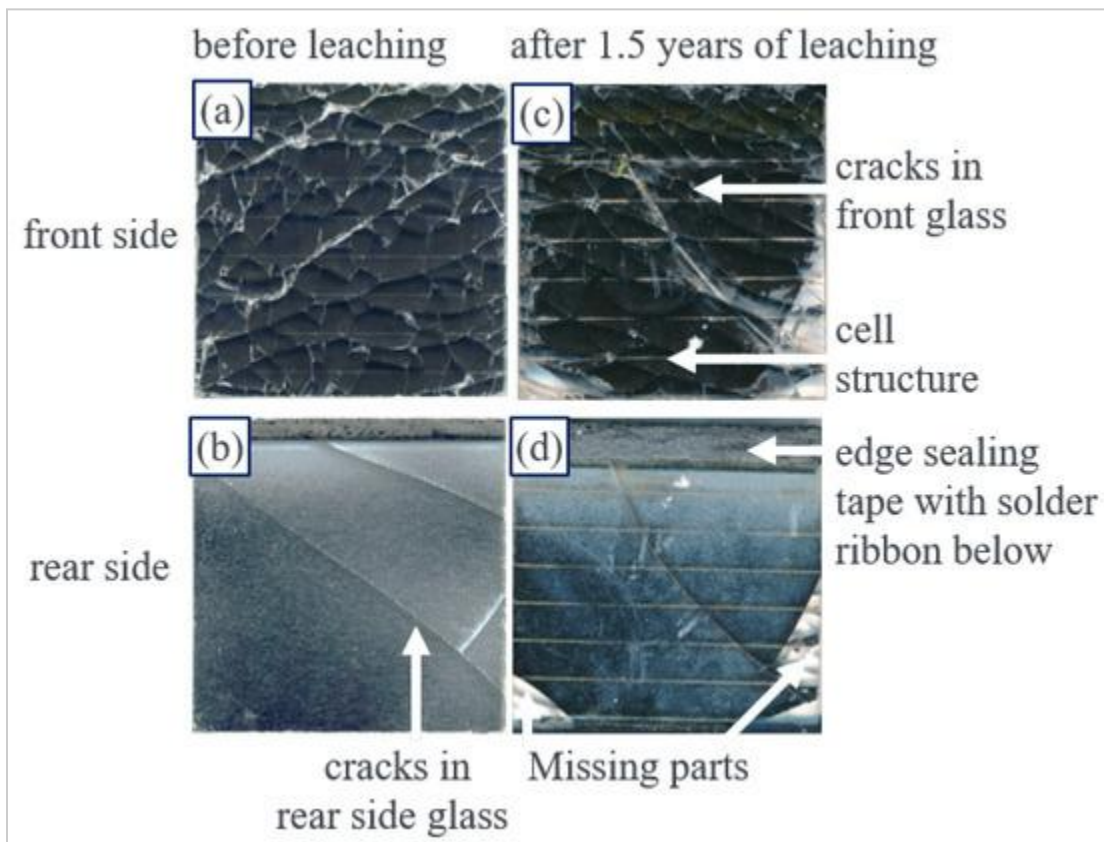


Figure 4. Photographs of (a) the front and (b) the rear side of a 5 × 5 cm

2

2 CIGS module piece before leaching. On the rear side, the edge sealing tape with the solder ribbon below is visible. In the front glass, as well as in the rear side glass, cracks are recognizable; they stem from the water jet cutting. (c) Front side after leaching for 1.5 years in pH 3 solution. (d) Rear side after leaching. Parts of the rear glass are missing, together with the back contact and the active layers. Only the transparent front glass remains

[Comment on Nover et al. Leaching via Weak Spots in](#)

[Photovoltaic Modules. Energies 2021, 14, 692](#) By Sinha and

Wade who have published many papers as employees of First

Solar. **Comment on Nover et al. Leaching via Weak Spots in**

Photovoltaic Modules. *Energies* 2021, 14, 692



by

Parikhith Sinha 1,*



and



Andreas Wade 2

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2First Solar, Amelia-Mary-Earhart-Straße 8, 60549 Frankfurt, Germany

16 February 2021

Point by point rebuttal reply to Sinha and Wade by Juergen Werner et al. of the Institute for Photovoltaic and Research Center- Stuttgart University, Germany and Institute for Sanitary Engineering, Water Quality and Solid Waste Management-Stuttgart University. April 12, 2021

<https://drive.google.com/file/d/1Ae7bljj960fFYvPy-J4g1mSpJkMyXHz/view>

[_ Could Social Influence Be Our Greatest Hope in Tackling the Solar Panel End-Of-Life Crisis?](#) Solar Magazine (Juergen Werner Editor in Chief) article on the importance of citizen participation/ influence on protecting our public water supply by pressuring socially responsible solar panel recycling BEFORE the time it takes for legislation to mandate that protective recycling/reuse.

Expert Dustin Mulvaney

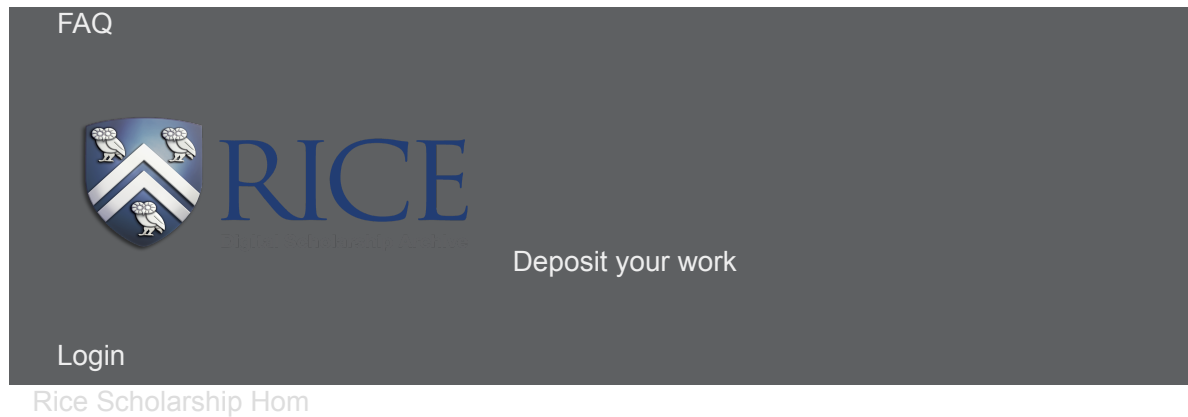
[Research gaps in environmental life cycle assessments of lithium ion batteries for grid-scale stationary energy storage systems: End-of-life options and other issues - ScienceDirect](#) LIB (lithium ion battery) ESS (energy storage system concerns, research and real life situation data/problems).

Dustin Mulvaney, a co-author, was a founder of the Silicon Valley Toxic Coalition. His work is focussed on expertise to provide solar development including battery storage that supports social justice and environmental safety which are inseparable externalities of solar development. This is another example of his work.

Rice University

[!\[\]\(cbe80b694ebd74fcfe136a095b608235_img.jpg\)scholarship.rice.edu > handle](https://scholarship.rice.edu/handle/)

by D Mulvaney · 2019 — That gets us to the **toxic** externalities of solar cell manufacture and his work with the **Silicon Valley Toxics** Coalition (<http://svtc.org>) to ...



Ep. #183 - Solar Power, Solar Justice (feat. Dustin Mulvaney)

00:00

00:00

Name:

coe183_dustin.mp3

Abstract

Cymene and Dominic cover the stress (and joy!) of center directorships and sandwich-making on this week's podcast. Then (13:53) Dustin Mulvaney (<http://www.dustinmulvaney.com>) visits the pod to tell us all the things we need to know about solar energy but were afraid to ask. He's the author of the excellent new book, *Solar Power: Innovation, Sustainability and Environmental Justice* (U California Press, 2019). We start by talking about whether it's possible to make a solar power revolution both rapid and just. That gets us to the toxic externalities of solar cell manufacture and his work with the Silicon Valley Toxics Coalition (<http://svtc.org>) to create a Solar Scorecard system that helps pressure manufacturers to clean up their production processes. Dustin breaks down for us the environmental advantages and disadvantages of both photovoltaic (PV) and concentrated solar (CSP) systems and then we turn to what he calls the "Green Civil War" brewing between animal rights activists and renewable energy activists over land use changes especially in the American Southwest. In closing we discuss whether a radically decentralized energy ecology could help advance environmental justice goals and what lessons should be learned from Obama era ARRA solar investments in terms of improving energy justice in the future.

Description

This recording and transcript form part of a collection of podcasts conducted by the Cultures of Energy at Rice University. Cultures of Energy brings writers, artists and scholars together to talk, think and feel their way into the Anthropocene. We cover serious issues like climate change, species extinction and energy transition. But we also try to confront seemingly huge and insurmountable problems with insight, creativity and laughter.

Mass. agency dismisses 2 battery storage projects, citing ...



Utility Dive

<https://www.utilitydive.com> › news › mass-agency-dis...

May 23, 2023 — A **Massachusetts** agency has dismissed two proposed battery energy storage systems, saying state law does not provide “clear guidance” on ...

Called BESS in Massachusetts a hearing of EFSB (Mass. Energy Facility Siting Board), recently reviewed relating to Carver with the state’s decision favoring Carver’s moratorium to learn more in contrast to the utilities’ desire to immediately build.