

Centre for Solar Energy Materials

Head of CSEM:

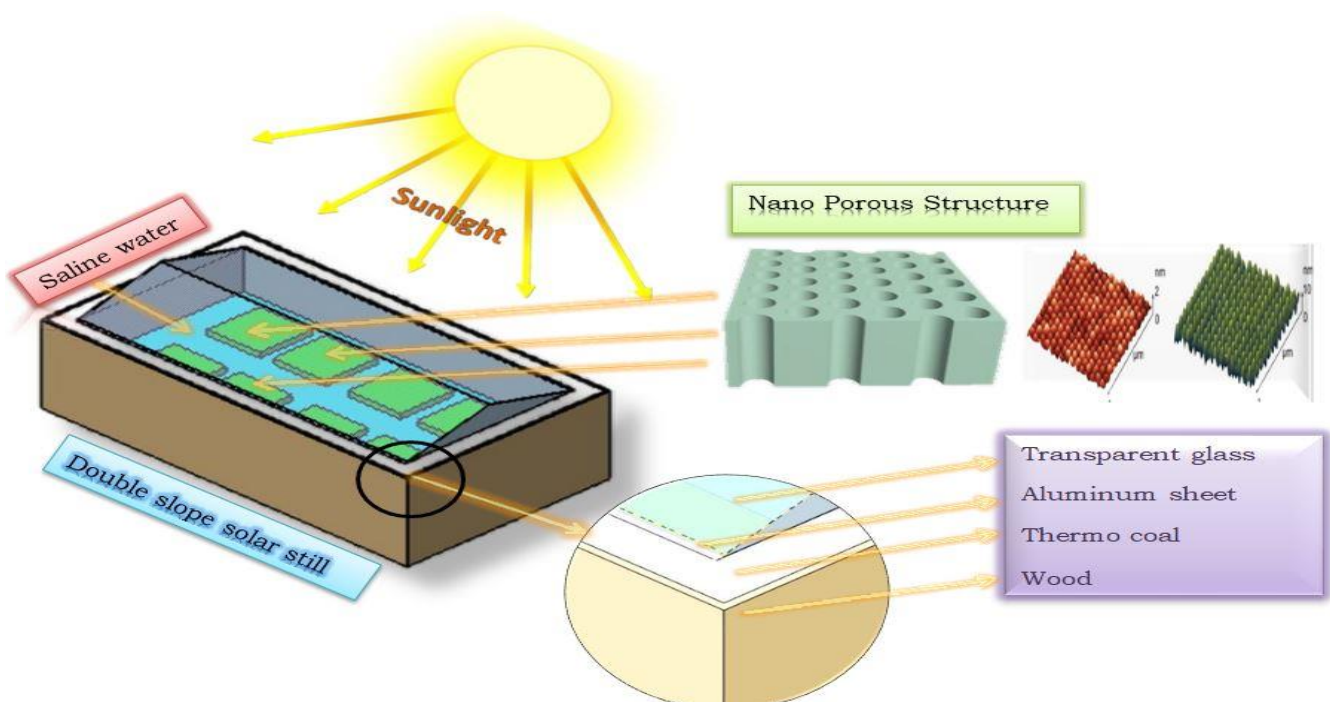
Dr. Ajay Kumar Kaviti

**B. Tech, M. Tech, PhD, LMIE,
LMISTE, LMMRSI,
LMISME, Chartered Engineer**

Associate Professor

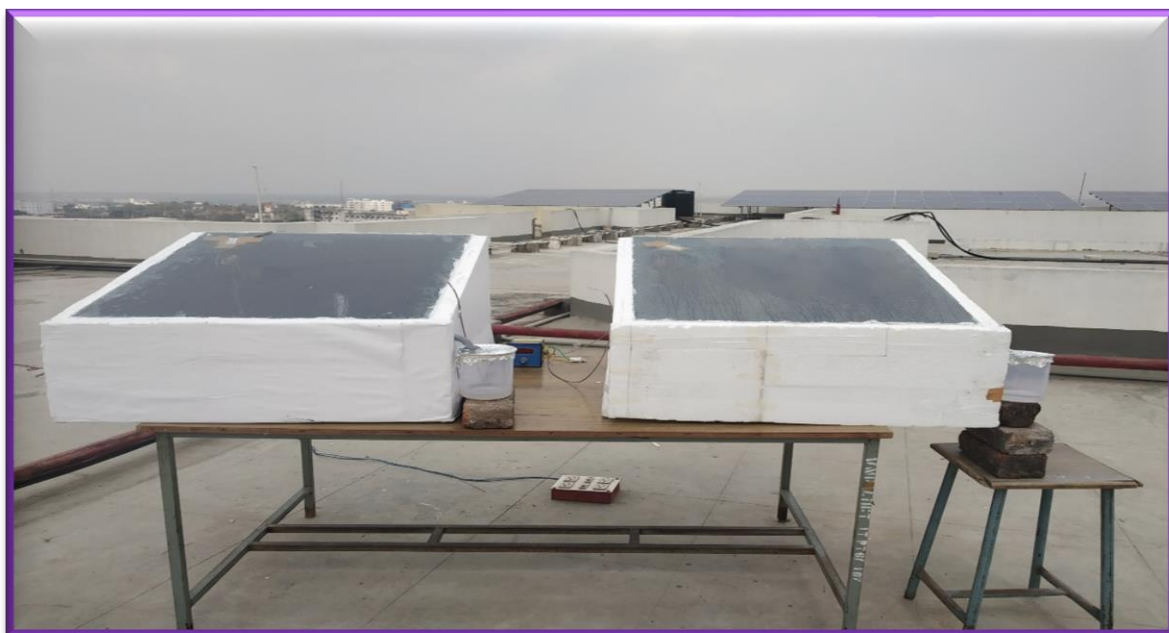


The development of new solar energy materials has been a potential game changer in the modern era of solar desalination. The flourishing solar energy desalination technologies and associated R & D in the development of this technologies are boosted with the India's National Water Mission (NWM). Centre for solar Energy Materials (CSEM) at VNRVJIET has been established in 2019 with a futuristic ideology of development and demonstration of various eco-friendly and economically viable technologies in the field of solar desalination. The center is known for its quality research and high-quality publications. Students of doctoral, post graduate and under graduate levels take full-fledge advantage of research projects funded by DST and other organizations.



The major areas of research:

- *Development of nanostructures.*
- *Development of non-contact nanostructures.*
- *Development of 3-D printed nanostructures.*
- *Usage of natural materials for development of high absorptive mesoporous structures.*







Research Projects

Development of Hierarchical Structures for Solar Desalination (Ongoing)

Project funded by DST under Water Technology Initiative (WTI) with a worth of 40.72 Lakhs

*Project sanction no: **DST/TMD/EWO/WTI/2K19/EWFH/2019/25***

Solar Desalination for nano and micro-Hierarchical Structures (Completed)

Project funded by TEQIP- III with a worth of 2.85 Lakhs

*Project sanction no: **JNTUH/TEQIP-III/CRS/2019/MECH/01***



Best Paper Presentation Award at NIT, Srinagar (International Conference on Nano Technology for Better Living 2021)

JRF, Mr. Akkala Siva Ram Under DST Project

Academic Projects

PhD: 01

- *Development of Non-Contact Nano Structure for Solar Desalination - Mr. Shaik Afzal Mohiuddin (Ongoing)*

PG: 06

- *Development of Micro Nano Hierarchical Structures for Solar Desalination - Mr. Akkala Siva Ram (Completed)*
- *Fabrication and Experimentation of Solar Still with Different Fin Geometries for Enhancing of Distilled Water - Ms. Begari Mary (Completed)*
- *Energy and Exergy Analysis of Double Slope Solar Stills with Truncated Conic and Parabolic fins - Mr. Vankdoth Rajaranadher Naik (Completed) From MREC, Hyderabad.*
- *Development of Nano Structures for Solar Driven Desalination – Mr. Yerolla Pavan Kumar (Ongoing)*
- *3D Printing Application on Solar Desalination – Mr. Kumar Venkateshwaran (Ongoing)*
- *Development of 3D Printed Interfacial Material for Solar Desalination- Ms. Mudavath Niharika (Ongoing)*

UG: 08

- *Performance Analysis of Stepped Solar Still Augmented with the Charcoal and Magnets - (Akhil Rajeev, D. Nikhil Kumar, Shiva Kumar, M. Suresh and K. Durgesh) (Completed)*

- *Effect of Permanent Magnets in Evaporation of Saline Water in Single Slope Solar Still - (Gujjula Rajesh Reddy, Kanteti Venatesh Babu, Khuram Shiva Kumar and Malloju Madhu Yella) (Completed) From MREC, Hyderabad.*
- *Fuzzy Logic Modelling in Solar Still - (D. Aravind Swamy, K. Abhikesh Chandra and M. Nagesh) (Completed)*
- *Analyzing the Performance of Solar Still with Nano Fluids by Fuzzy Logic - (G. Harshitha, K. Nikitha and T. Rajini Meghana) (Completed)*
- *Experimental Analysis of Solar Still Using Copper Tubes and Parabolic Fins Coupled with Copper Tubes - (Magadapalli Teja, Oruganti Madhukar, Polaboina Bhanu Teja and Vakapalli Aashish) (Completed)*
- *Effect of Water Depth on the Performance of Non-Contact Nano Structure Solar Still - (D. Rama Madhu Dinesh Reddy, Harish Thiramadas, K. Vinay Kumar and M. Kalyan) (Completed)*
- *An Experimental Study on Eco-Friendly and Cost-Effective Banana Stem in Single Slope Solar Still for Desalination – (Dasari Shiva, Moodapelly Mahesh, Pilli Sai Snehith, Pokala Karthik, and Sirimalla Manikanata) (Completed)*
- *Experimental Investigation of Single Slope Glass Solar Still Using Hybrid Nanofluids- (B. Raj Kumar, Mohd Affan Ali, and P. Anusha) (Completed)*



Research Facilities

S no	Name of the Equipment	Year of Purchase	Cost of the Equipment
1.	Programmable DC Power Supply	2021	Rs. 1,89,000/-
3.	Horizontal Microscope with Camera & back light	2021	Rs. 1,60,797/-
3.	Platinum Foil	2021	Rs. 1,08,980/-
4.	Precision Balance ME4001E/A04	2021	Rs. 59,224/-
5.	Precision Balance ME1002E/A04	2021	Rs. 57,524/-
6.	Hukseflux Pyranometer	2021	Rs. 55,440/-
7.	XYZ Heavy Duty Translation Stage	2021	Rs. 49,010/-
8.	Five Easy Plus pH Meter	2021	Rs. 36,499/-
9.	Experimental Setup for Solar Desalination	2020	Rs. 44,238
10.	Digital pH Meter	2020	Rs. 5,500/-
11.	Digital TDS Meter	2020	Rs. 5,000/-
12.	Digital Weight Balance	2020	Rs. 4,500/-
13.	Digital Ultrasonic Cleaner	2019	Rs. 14,710/-
14.	Magnetic Stirrer	2019	Rs. 9,269/-
15.	Solar Power Meter	2019	Rs. 8,500/-
16.	Anemometer	2019	Rs. 4,200/-
17.	Temperature Indicator 12 port	2019	Rs. 2,200/-
18.	Digital Thermometer and K-type Thermocouple Wire	2019	Rs. 2,100/-



MicroScope



Pyranometer



pH Meter



DC Power supply



XYZ Translation Stage



Precision Balance ME4001E/A04



Magnetic Stirrer



Ultrasonic Cleaner



Solar Power
Meter



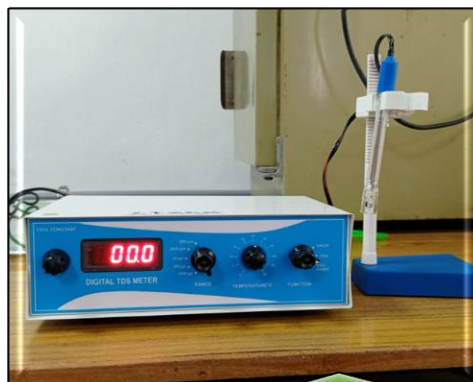
Precision Balance
ME1002E/A04



Weight
Balance



Anemometer



Digital TDS
Meter



Temperature
Indicator



Digital pH
Meter



Solar Stills

Publications

S no	Title of the Paper	Journal name with month & Year of publications	ISSN/ISBN no.	Impact factor	Links
1.	Experimental assessment of productivity and sustainability of nanoporous Cr-Mn-Fe oxide nanocoating in solar-powered desalination	Process Safety and Environmental Protection & 06/2022	0957-5820	SCI 7.926	https://doi.org/10.1016/j.psep.2022.03.038
2.	Advanced design techniques in passive and active tubular solar stills: a review	Environmental Science and Pollution Research & 05/2022	1614-7499	SCI 5.190	https://doi.org/10.1007/s11356-022-20664-6

3.	Historic review and recent progress in internal design modification in solar stills	Environmental Science and Pollution Research & 03/2022	1614-7499	SCI 5.190	https://doi.org/10.1007/s11356-022-19527-x
4.	Effect of truncated conic fins in distillate of double slope solar still	Innovations in Mechanical Engineering & 2022	2195-4356	Scopus, Web of Science	https://doi.org/10.1007/978-981-16-7282-8_33
5.	Comparison of energy and exergy analysis of parabolic fin solar still with conventional solar still	Innovations in Mechanical Engineering & 2022	2195-4356	Scopus, Web of Science	https://doi.org/10.1007/978-981-16-7282-8_36
6.	Nanostructures as High Absorption Energy Materials—A Review	Recent Advances in Sustainable Technologies & 2021	2195-4356	Scopus, Web of Science	https://doi.org/10.1007/978-981-16-0976-3_30

7.	Simulation study on effect of fin geometry on solar still	Innovations in Sustainable Energy and Technology & 2021	2662-6829	Scopus, Web of Science	https://doi.org/10.1007/978-981-16-1119-3_19
8.	Progress on suspended nanostructured engineering materials powered solar distillation-a review	Renewable and Sustainable Energy Reviews & 2021	1364-0321	SCI 14.98	https://doi.org/10.1016/j.rser.2021.110848
9.	Productivity enhancement of stepped solar still by loading with magnets and suspended micro charcoal powder	Energy Sources, Part A: Recovery, Utilization, and Environmental Effects &2021	1556-7230	SCI 3.447	https://doi.org/10.1080/15567036.2021.2006371
10.	Energy and exergy analysis of a truncated and parabolic finned double	International Journal of Ambient Energy	2162-8246	Scopus, Web of Science	https://doi.org/10.1080/01430750.2021.2009368

	slope solar stills				
11.	Influence of fully submerged permanent magnets in the evaluation of heat transfer and performance analysis of single slope glass solar still	Proceedings of the Institution of Mechanical Engineers, Part A: Journal of Power and Energy & 2021	2041-2967	SCI 1.882	https://doi.org/10.1177/09576509211031021
12.	Energy and exergy analysis of double slope solar still with aluminium truncated conic fins	Materials Today: Proceedings & 2021	2214-7853	Scopus, Web of Science	https://doi.org/10.1016/j.matpr.2021.02.047
13.	Influence of aluminium parabolic fins as energy absorption material in the	Materials Today: Proceedings & 2021	2214-7853	Scopus, Web of Science	https://doi.org/10.1016/j.matpr.2020.12.603

	solar distillation system				
14.	An overview on hydrogel materials for solar desalination	Materials Today: Proceedings & 2021	2214-7853	Scopus, Web of Science	https://doi.org/10.1016/j.matpr.2020.12.604
15.	Development of hierarchical structures for enhanced solar desalination	Materials Today: Proceedings & 2020	2214-7853	Scopus, Web of Science	https://doi.org/10.1016/j.matpr.2020.09.473
16.	A brief review on high-performance nano materials in solar desalination	Materials Today: Proceedings & 2020	2214-7853	Scopus, Web of Science	https://doi.org/10.1016/j.matpr.2020.09.466
17.	Effect of glass cover angles on the performance of double slope solar still: A CFD	International Journal of Mechanical and Production Engineering Research and	2320-2092	Scopus	http://www.tjprc.org/publishpapers/2-67-1600491380-1338IJMPERDJUN20201338.pdf

	simulation analysis	Development 2020			
18.	Experimental investigation of solar still with opaque north triangular face, 1-8	International Journal of Green Energy & 2019	1543-5075	SCI, 1.388	https://doi.org/10.1080/15435075.2019.1578658
19.	On the Evaporation of Fine Hydrophobic Camphor Soot Mixed Water, 6203-6207	Materials Today: Proceedings & 2018	2214-7853	Scopus, Web of Science	https://doi.org/10.1016/j.matpr.2017.12.228
20.	A Comprehensive Review of Scheffler Solar Collector, 890-898	Renewable and Sustainable Energy Reviews & 2017	1364-0321	SCI, 14.982	https://doi.org/10.1016/j.rser.2017.03.044
21.	Inclined Solar Still Designs: A review, 429-451	Renewable and Sustainable Energy Reviews & 2016	1364-0321	SCI, 14.982	https://doi.org/10.1016/j.rser.2015.10.027

22.	Solar stills system design: A review, 153-181	Renewable and Sustainable Energy Reviews & 2015	1364-0321	SCI, 14.982	https://doi.org/10.1016/j.rser.2015.04.103
23.	An experimental study on single basin double slope passive solar still with different water depths, 1-6	International research journal of engineering and applied sciences & 2016	2322-0821	Scopus, Web of Science	Microsoft Word - 02 ~ Lakhan Kumar ~ IRJEAS04V4I1011603160002

Patents

1. Patent Title: **NON-CONTACT NANOSTRUCTURE AND METHOD OF MANUFACTURING THE SAME FOR FOULING FREE SOLAR DESALINATION**

Applied/Published/Granted: **Published**

Application No.: 202241000685 A

Patent Journal Details: **Journal No. 03/2022 Dated 21/01/2022, pp.3106.**

2. Patent Title: **SUBMERGED NANOPOROUS MICRO HOTSPOT STRUCTURE FOR SOLAR DESALINATION AND METHOD OF PREPARATION**

Applied/Published/Granted: **Published**

Application No.: 202241003900 A

Patent Journal Details: **Journal No. 05/2022 Dated 04/02/2022, pp.6344**

3. Patent Title: ECO-FRIENDLY SOLAR DESALINATOR

Applied/Published/Granted: **Published**

Application No.: 202241033629 A

Patent Journal Details: **Journal No. 24/2022 Dated 17/06/2022, pp.37380**

4. Design Patent Title: SOLAR DESALINATOR

Applied/Published/Granted: **Granted**

Design No.: 359786-001

Patent Journal Details: **Dated 23/05/2022.**

Books Published

1. Applied Soft Computing Techniques for Renewable Energy. eBook ISBN: 978-1-53618- 180-7. Nova Publishers, 2020, USA
2. Internet of Things for Agriculture 4.0- Impact and challenges. ISBN: 9781774630020 CRC Press, Taylor and Francis Group, 2021