PERFORMANCE OF NEW DYES ALONG WITH SOME SEMI CONDUCTIVE OXIDES AND ANALYSIS OF THE SAME

[1]Veeresh Kumar S , [2]: Hiregoudar.Yerrana goudar

[2]Phd Scholar,HOD For MTech ,
Thermal power engineering, RYMEC Bellary , Bellary , India
,
2veereshkumar.seelavanth@gmail.com,
hiregoudar.yng@gmail.com,

Abstract— In communication Tio2 thin films with Balagidda flower-like both were applied on conductive fluorine-doped tin oxide (FTO) substrates through a Carbon soot (Candle is lit that flame is used as a carbon soot) that is nothing but counter electrodes in dye-sensitized solar cells (DSSCs).Different solvents were used to prepare the dye with various combination (Ethanol,Methanol,DM water, Distilled water ,Linced oil) with some ratios the structure of the nanostructured thin films and their performance as DSSC were investigated. Scanning electron microscopy revealed a material with an crust and trough structures like morphology. With X-ray diffraction analysis, With the help of thermal imager, X-ray Florescence's and with the optical microscope used for analysis .for dyes analysis used UV-spectrophotometer and UV-spectrophotometer (D-5000) ,to find the PH values used ph-meter ,to find the colorimeter used colorimeter, chromatography paper used to find the components present in the natural dyes.

Keywords—Unknownflower2 (Bala gidda), DSSC, FTO, ITO, Ph, Voc, Isc.

1. INTRODUCTION

With the help of photosensitizer based dye sensitized solar cell is one type of device which convert sun rays that is light rays which converts light energy into electrical energy and having the capacity to absorb photons from sunlight te Dssc solar cells it mainly consists of three types of component which are working electrode, electrolyte solution and counter electrode.The working electrode which is anode type composed of transparent conductive glass which ae of two types fluorine doped tin oxide (FTO) and other Indium tin oxide (ITO) any one of them is used Dye of different types are used obtained from fruits,flowers,trees & seeds,tems,roots etc which serves as a sensitizer for Dssc where transfer of electrons to the anode or working electrode & semiconductors occurs.

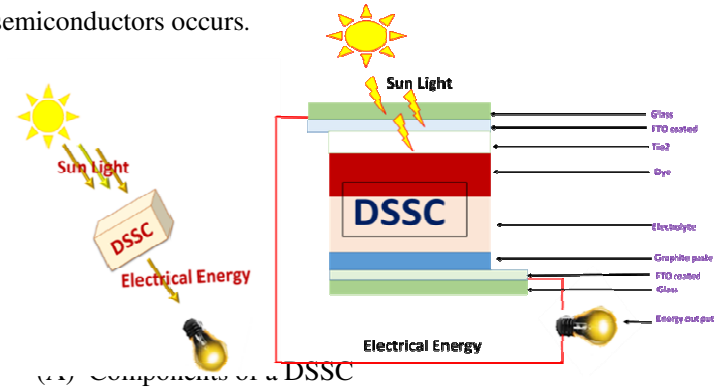
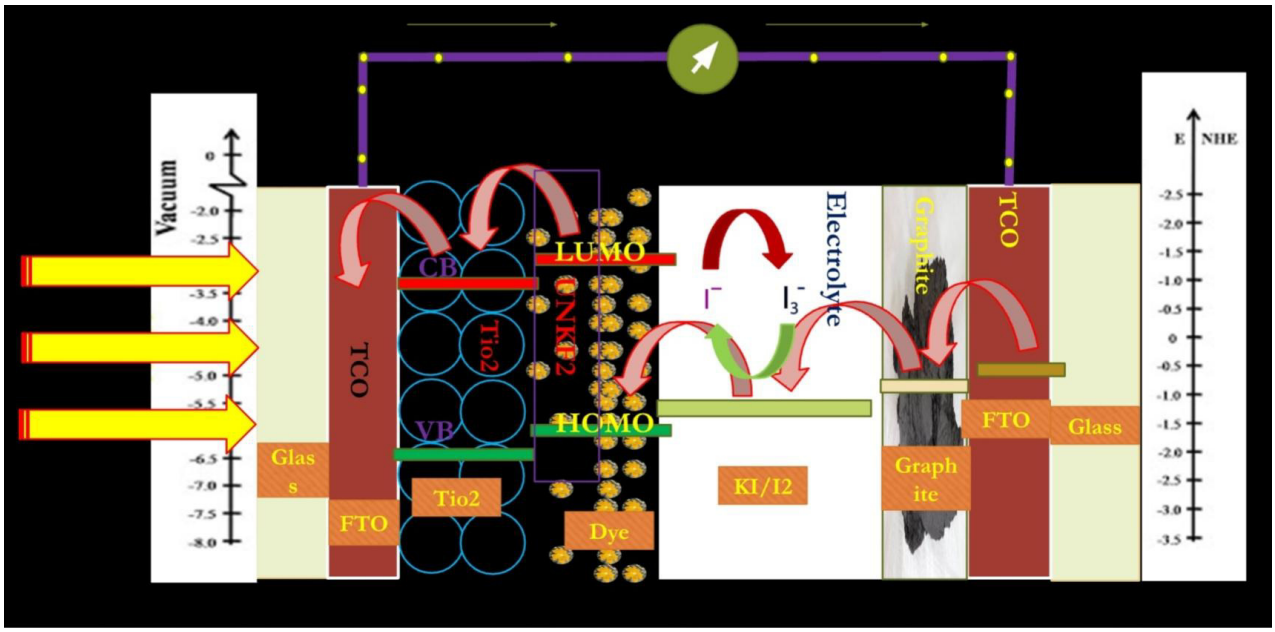


Figure no 1: Basic of Principal of DSSC

(A) Components of a DSSC



(B) Working of DSSC

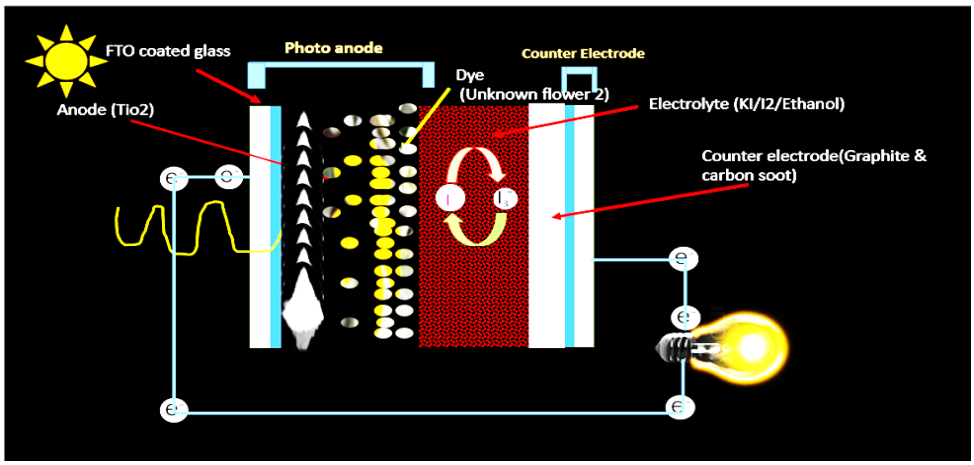


Figure no 2: A) Components of the DSSC, B) Working of DSSC

When sunrays fall on DSSC it will penetrate into the FTO coated glass and reaches this sunrays to dye, where these dye will generates the electrons and that generated electrons will transferred through the Tio2 coated material on glass which is porous in structure and absorbed by the dye molecules and the produced electrons will pass through this material and on glass to external circuit, in the dye their will be loosing of one electron takes place that will be fulfilled by the electrolyte and that electrolyte will loosen one electron and that is received back with the help of counter electrode, this when electrons move from photo anode region it will do some work and reaches back to counter electrode then back to electrolyte this completed one cycle like this it completes many no of cycles.

2 Methodology

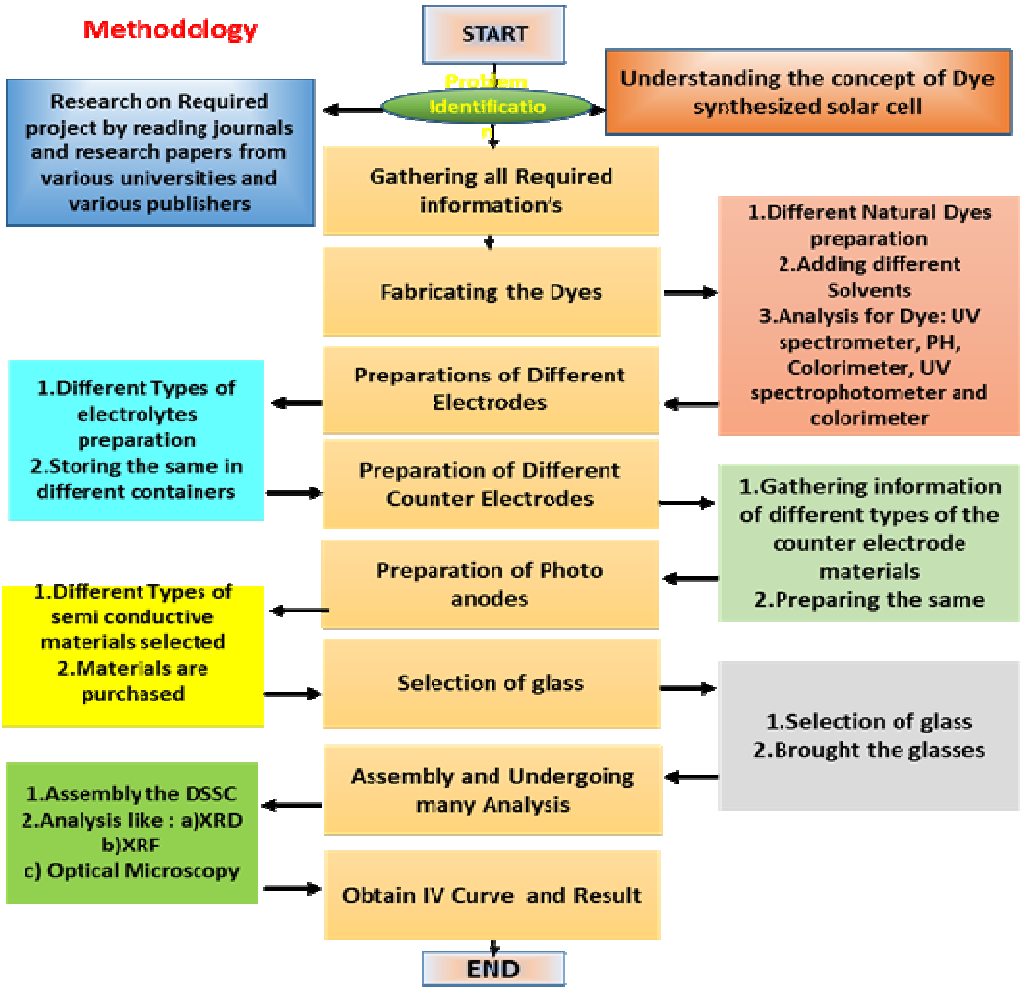


Figure no 3: Methodology for preparation of DSSC

3. . Experimental details

3.1 Chemical choose and preparation

Take 1 gram Titanium dioxide (Which is semiconductor oxide) by weighing in a weighing machine(figure 2) in a separate watch glass as taken shown in figure 1 and put in a mortar and pestle shown in figure 3 by taking dilute nitric acid add required propionates till the paste is formed made the paste which is thicker than water and thinner than paint.

Figure No: 4

Figure No:5

Figure No: 6

3.1.1. Preparation of Photo anode and Their Analysis

TIO2 quantity taken for Unknown flower2 Flower		
Slno	**Particulars**	**Weight in grams**
1	Weight of empty Beaker	51.166
2	Weight of empty Beaker + TIO2	53.189
4	Total weight of TIO2 power	**2.023**

Table no 1: TiO2 powder taken for preparation for photo anode

Glass used for Congress for Unknown flower2 Flower		
Slno	**Particulars**	
1	Type	FTO Coated
2	Dimensions	25mm*25mm*2.2mm
3	Resistivity	≤ 15ohms/sq
4	Transmittance	≥85%
5	product code	FTO15Y1
6	HSN/SAC	7020019
7	Brand	Shilpent

Table no 2: Glass properties selected for preparation of DSSC

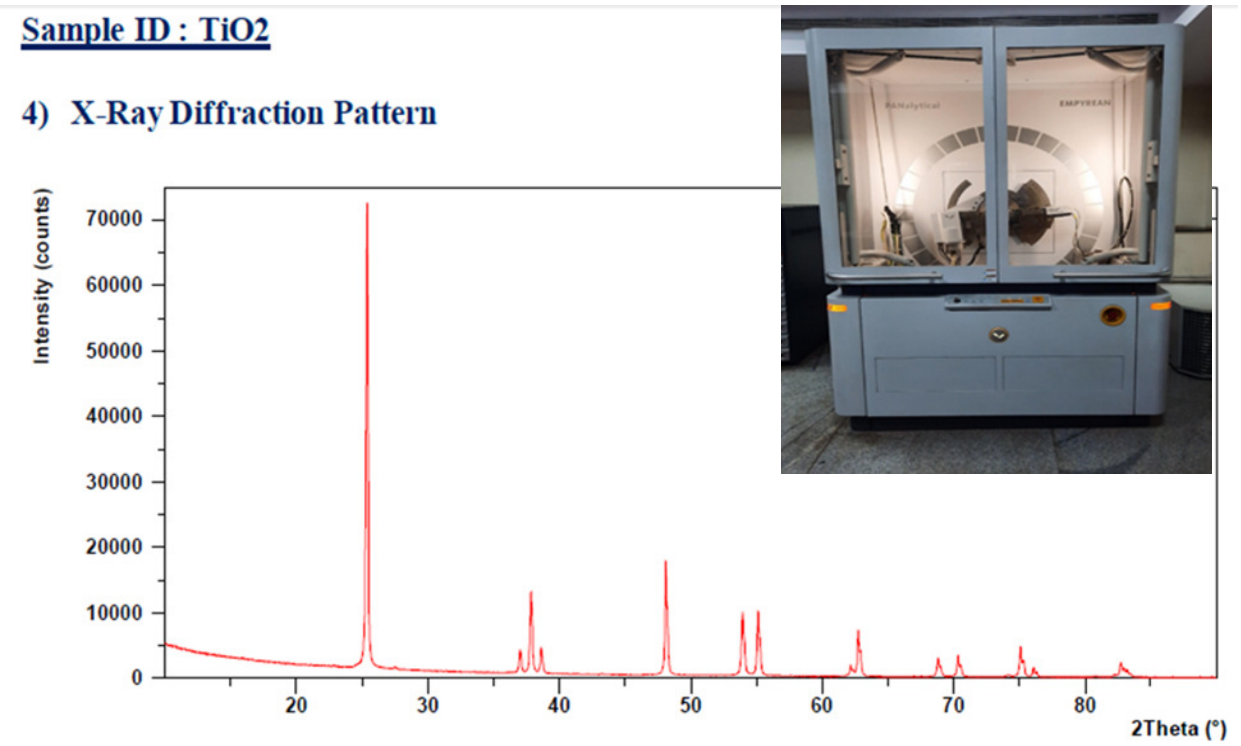
3.1.2 XRF

Figure no 7: XRF machine

	A	B	C
1		QMC	
2		31-Dec-20	
3	Sample ID : TiO2 Powder		
4	Sample given by : Mr. Veeresh		
5	Sample ID	TiO2 Powder	
6	%Chemical Analysis (The values are Indicative only)		
7	TiO2	97.86	
8	V2O5	0.92	
9	P2O5	0.36	
10	K2O	0.24	
11	Re2O7	0.130	
12	Na2O	0.109	
13	MgO	0.072	
14	MoO3	0.063	
15	SiO2	0.043	
16		QMC_CHEMICAL LAB	
17			

Table no 3: XRF analysis report

3.1.3 XRD



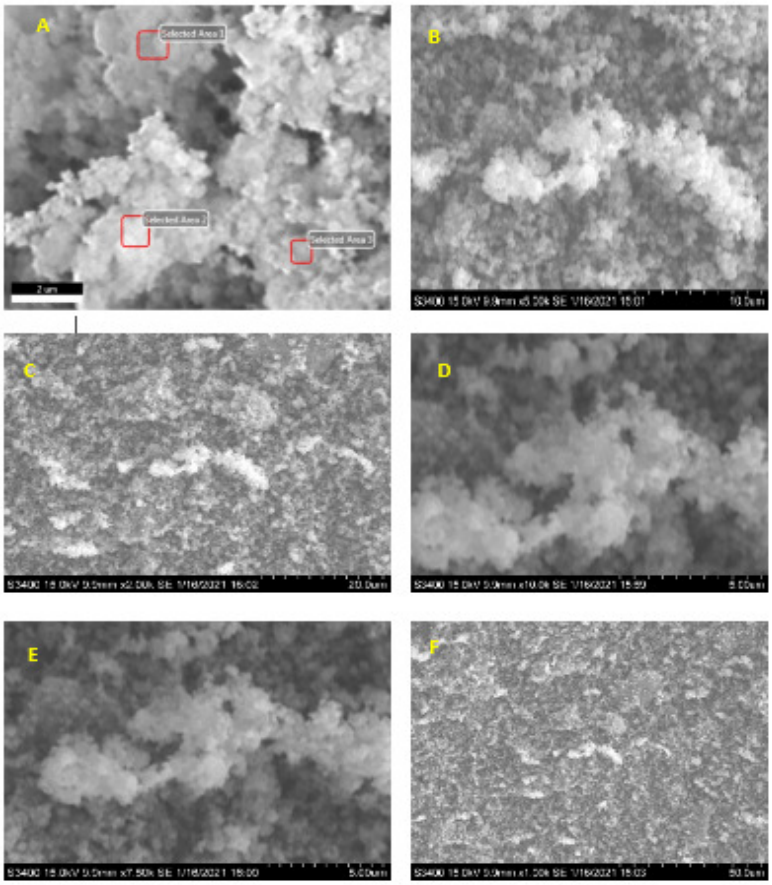
Graph no 1: Show the details elements present in semi conductive material used for preparation of DSSC

3.1.4 SEM

Element	Atomic %
C K	3.16
O K	63.49
NaK	0.36
P K	0.33
ClK	0.09
K K	0.12
SnL	0.05
TiK	32.40

a) Elements

b) SEM Machine



c) Images of Tio2 coated Morphology of coating material

Figures 8: Systematic of SEM and It's analysis images

Figure A the main sample in that we have chosen the three parts and the part1 is taken with different resolutions 500,1000,1500 and 2000 as shown in the above B, C,D,E and F. In the figure we can seen the closely over lapping of the tio2 material ,In the figure C we have the crusts and troughs, in the figure D a large and small cavities were seen, in figure E bonding is seen in very good manner and in final figure F still more zoomed and we can see the structure of good manner which is very helpful to absorb the dye molecules.

3.1.5 Counter electrode preparation

1.Use 2HB pencil (this is coated with the help of pencil) and carbon soot is deposited (by lighting the candle with the help of match box the flame is generated and hold the specimen on the top of flame by abstracting the flame propagation, which coats the black residues nothing but carbon coating)

Figure no 9: coating arrangement and coating of cartoon soot

3.1.6 Preparation of Dyes and Their Analysis

Take the Unknown flower2 wash it them for removing of the dust present on the Unknown flower 2 due to movement of wind which it carry foreign particles which are settled on Unknown flower2 during the movement of wind which is abstracted during the wind blows by the Unknown flower 2 to remove the same washed with the water ,dried in a room for half an hour and then the Unknown flower 2 then those are put it in a mortar and pestle crushed and then stored in a separate bottle by filtering with the help of coffee filter paper and added 95% Ethanol (12Ml) & 15% acetic acid, it is air tight by closing the bottle with the cap , wrapped the bottle with the aluminum foil and kept for 12hours. This is repeated for other selected natural dyes and used different solvents and quantity are listed below following tables

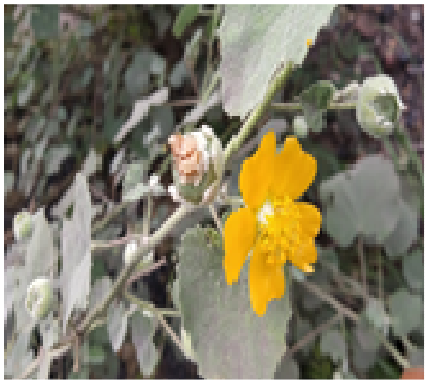
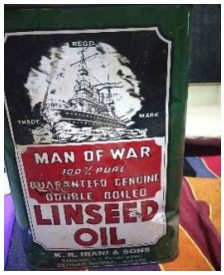


Figure No 10 : a) Unknown plant **b) Flower (Bala gidda)**

3.1.7 Chemicals (Solvents) used for dyes preparation



Ethanol Distiled waterb Linced oil Methanol

Figure No 11:Solvents used for dye preparations

Name of the dye : Unknown Flower 2 Flower							
Slno	1	2	3	4	5	6	
Descriptions	Ethanol	Methanol	Linced oil	Dm water	Distilled water	Ethanol	Acetic acid
Total quantity add solvent for dye	30ml	20ml	40ml	20ml	60ml	10ml	10ml

Table no 4: solvents used along with quantity used for dye preparation

3.1.8 Dye PH Value finding

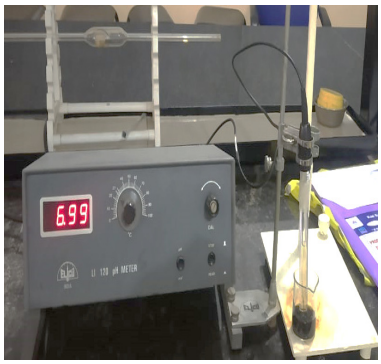
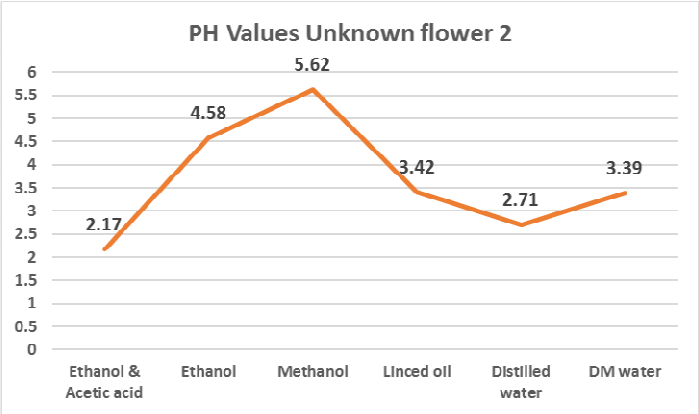


Figure no 12: Ph- meter

PH values of the samples		
Slno	**Particulars (Solvents)**	**PH Values**
1	Ethanol & Acetic acid	2.17
2	Ethanol	4.58
3	Methanol	5.62
4	Linced oil	3.42
5	Distilled water	2.71
6	DM water	3.39

Tabele no 5: oh values for different solvents

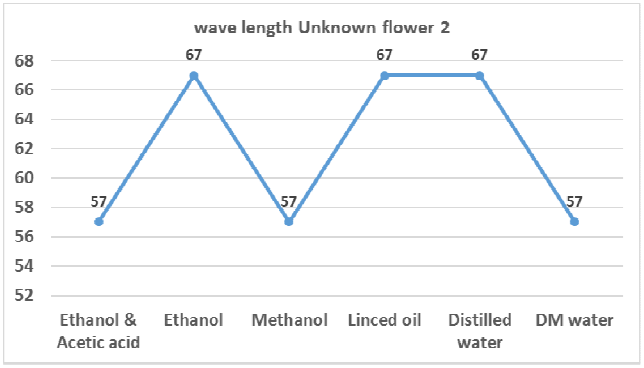
Graph no 2: PH readings



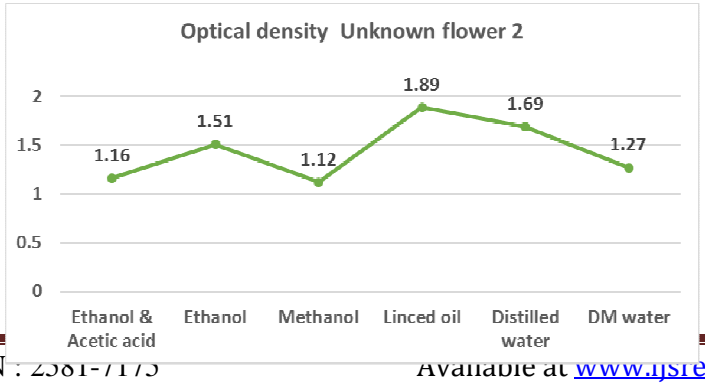
3.1.9 Dye Colorimeter

Colorimeter : Filter selection for maximum optical density			
Slno	**Particulars**	**wave length**	**Optical density**
1	Ethanol & Acetic acid	57	1.16
2	Ethanol	67	1.51
3	Methanol	57	1.12
4	Linced oil	67	1.89
5	Distilled water	67	1.69
6	DM water	57	1.27

Tabele no 6: Colorimeter readings



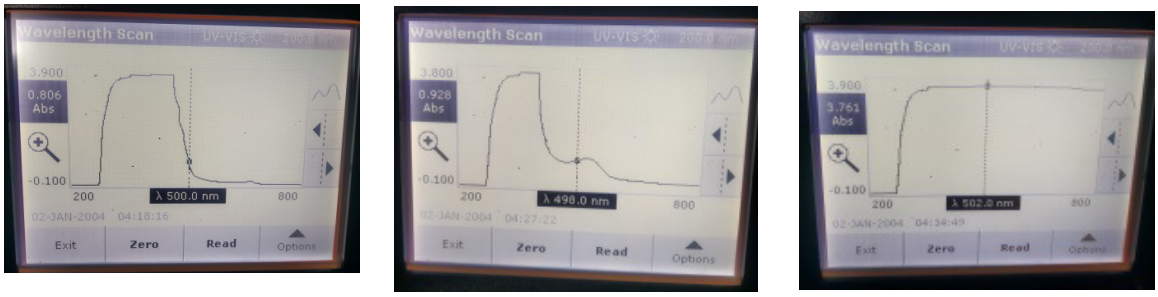
Graph no 3: colorimeter



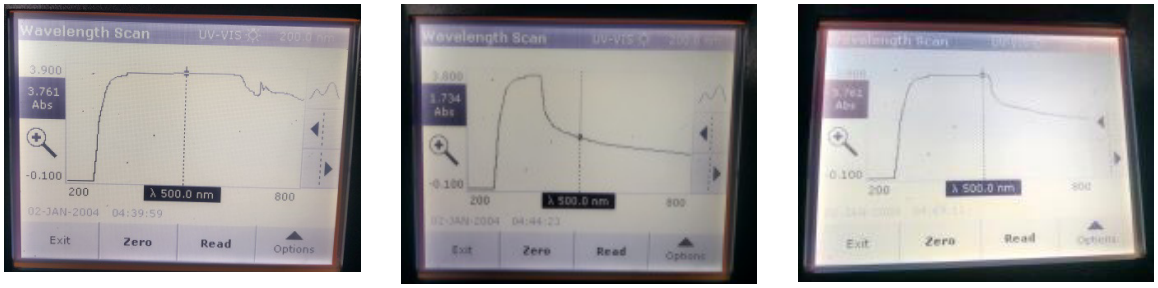
Graph no 4: colorimeter optical density

3.1.10 UV-Spectrophotometer

Figure no 13: UV Spectrophotometer D-5000



a) Ethanol **B) Methanol** **C) linced oil**



d) DM water **e) Distilled water** **f) Mixed (ethanol + Acetic acid)**

Figures no 14: UV-Spectrophotometer of all Solvents

The sample is taken in the UV spectrophotometer in a cuvette in one and I need another we have to take the solvent then we have to make the zero with the sample solvents and then each sample containing different solvents are measured and they are drawn the graphs as shown in the below figures

3.1.11 Spector Photometer

Figure no 15 : UV-spectrophotometer

Adjust and set the values of UV- spectrophotometer and keep the cuvveet in side the slots and by changing the wavelengths and by pressing the T% that is transparency and observation can be calculated figure (A) in this we can measure the wavelength 400 for all different solvents and by pressing the T%, abs and con (concentration), (B) here we are measuring the individual maximum wavelengths along with the abs, T%, Abs, Con, (C) in this tabular column we can find the different solvents and with different maximum band with gap with the proper equations calculated the energy band gaps and all are tabulated in respective tabular columns and they are as shown in the below.

Wave length set for 400nm in UV spectrometer					
Dye Name : Un Known flower 2					
Slno	Solvents	λ (nm)	%T	Abs	Con
1	Distilled water	400	52.2	0.284	368
2	Ethanol		49.3	0.310	409
3	Methanol		27.7	0.556	733
4	DM water		45.0	0.340	453
5	Linsed oil		14.9	0.824	1037

(A)

Maximum Wave length finding of Unknown flower2 by using UV spectrometer					
Dye Name : Un Known flower 2					
Slno	Solvents	λ (nm)	%T	Abs	Con
1	Distilled water	600	54.6	0.263	337
2	Ethanol	400	49.3	0.310	409
3	Methanol	400	27.7	0.556	733
4	DM water	1000	52.6	0.258	340
5	Linsed oil	1000	22.6	0.648	826

(B)

UV spectrometer for finding the Energy band gap					
Dye Name : Un Known flower 2					
Slno	Solvents	λ (nm)	$Eg = h(C/\lambda)(ev)$		
			h Js	C m/s	Eg
1	Distilled water	600	6.63E-34	300000000	3.59025E-30
2	Ethanol	400			5.38538E-30
3	Methanol	400			5.38538E-30
4	DM water	1000			2.15415E-30
5	Linsed oil	1000			2.15415E-30

(C)

Tabular column no 7: Shows the reading of the Sample taken a) A wave length 400 b) Different wavelength for maximum c) Finding Energy band gap

3.1.12 Electrolyte preparation

Slno	Particulars	Weight in grams
1	Weight of empty Beaker	51.408 g
2	Weight of I2	0.313 g
3	Weight of KI	0.415 g
4	Total weight of empty beaker,KI & I2	**52.136 g**
5	Ethanol	**0.8Ml**

Table no 8 : KI+I2+Ethano

Result and discussion

1. Optical microscope

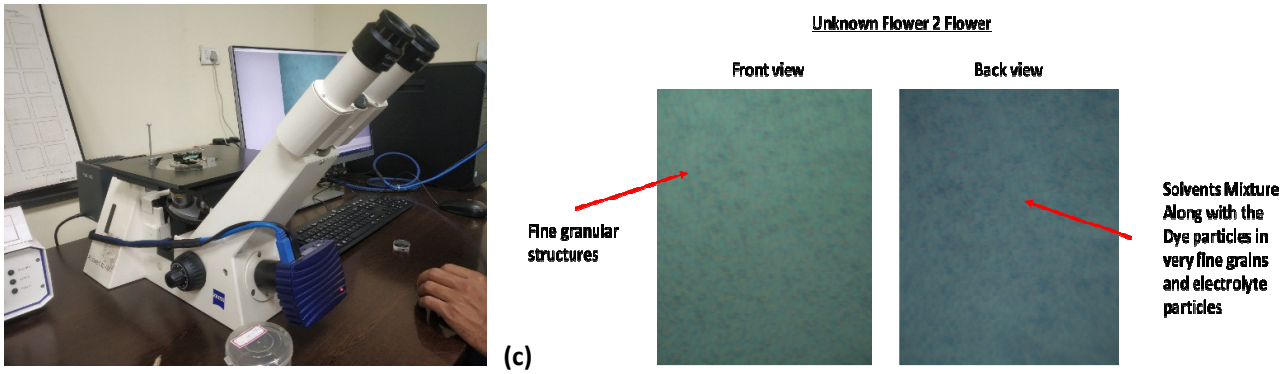


Figure no 16 : a) Optical Microscope b) Front view of the DSSC c) Back View of the DSSC

Take the prepared Dssc and keep that in the sample hold place and adjust the lenses and take the photograph by adjusting the resolutions and observed asbshown in the figure (b) & (c) we can write the observations

2. Thermal Imager

Keep the Dssc in open sunlight with the help of thermal imager take the thermal images and connect to the pc and with the help of view software we generate the report as given below

Image one (5725.IS2)

IR_05714.IS2

5/21

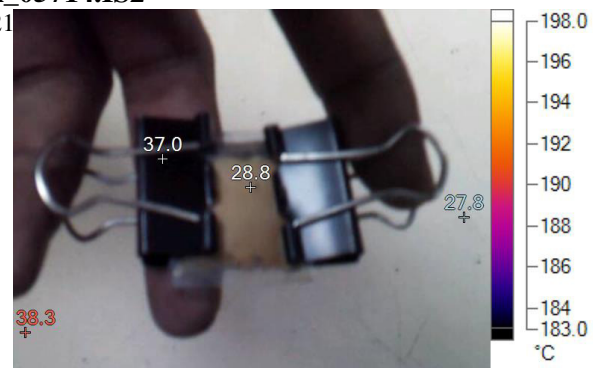
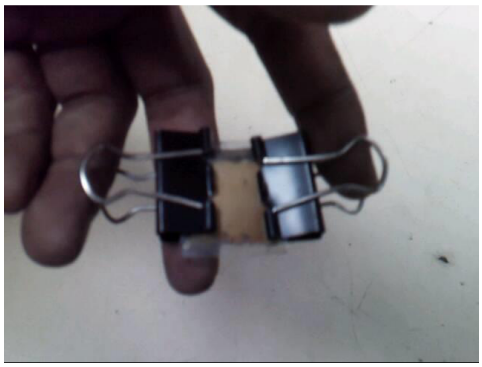


Figure no 17: IT image



Visible Light Image

Figure no 18: Visible light image

Image Info

Camera Model	TiS40
IR Sensor Size	160 x 120
Camera serial number	TiS40-16080266
Camera Manufacturer	Fluke Thermography

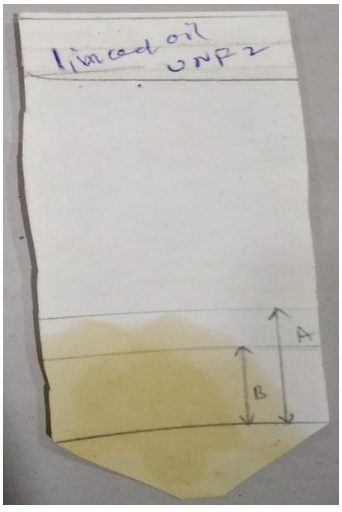
Table no 9: information table

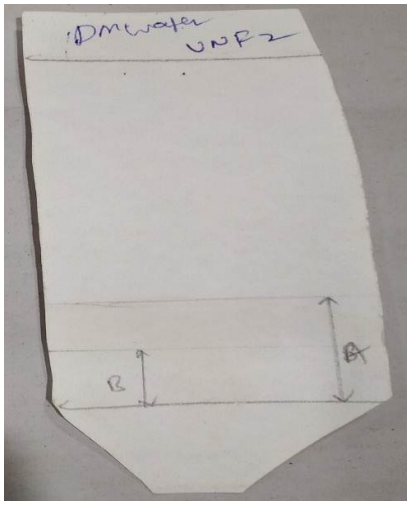
Main Image Markers

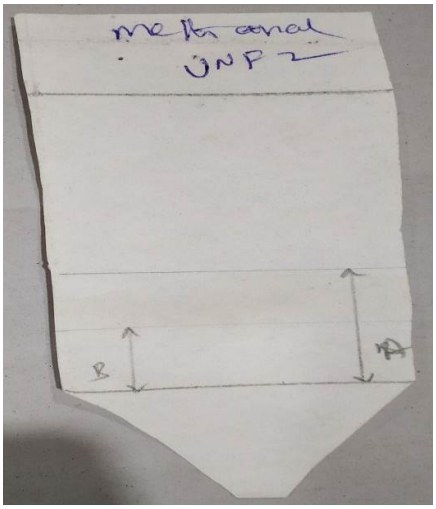
Name	Temperature	Emissivity	Background
Centerpoint	28.8°C	0.95	22.0°C
Hot	38.3°C	0.95	22.0°C
Cold	27.8°C	0.95	22.0°C
P0	37.0°C	0.95	22.0°C

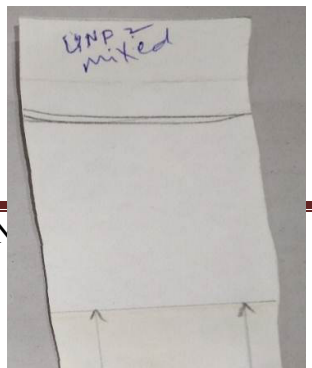
Table no 10: Main image markersn

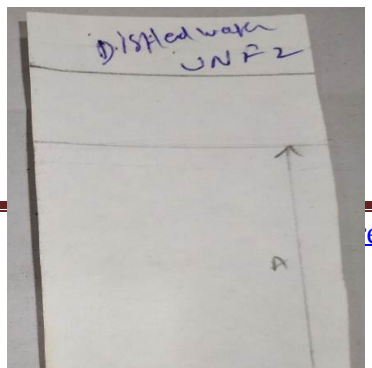
2. Chromatography

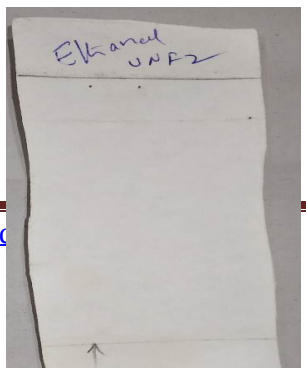


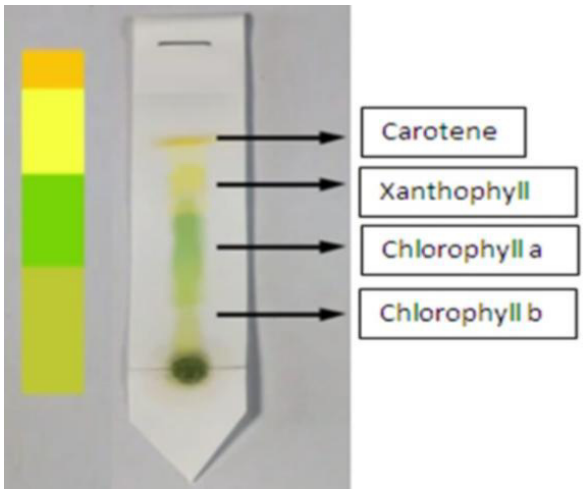












A)Chromotography images

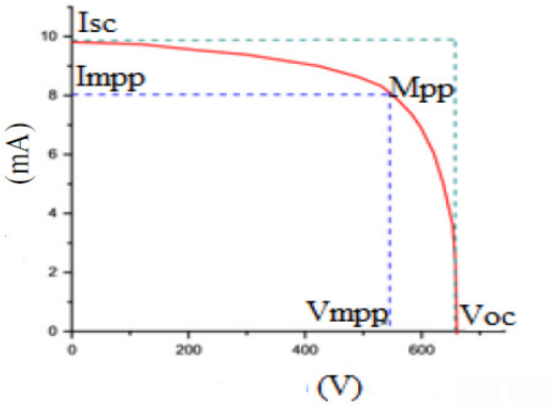
B) Compnents

Figure no 19: (A) Chromatography images, (B) components comparisons

The chromatography experiment is conducted to know what are the components present in that dye, we have to take the dye (balagidda) flowers we have to wash and we to crush the flowers in a mortar and pestle and with the help of of watsman filter paper and this is kept ready for other different solvents, take the six tea cups and apply the rubber band and take the chromatography paper and then cut to the required shapes and write the labels to identify better in feature and then add some quantity of solvents in the glass ,mark the origin and front end in the paper then with the help of capillary tube put two to three drops of dye in marked region as origin rubber band keep that chromatography paper into the solvent added in a cup(Ethanol is added in a cup) due to capillary action it will raise and reaches new end and measured the distance and then find out the components present by colour recognition

3 Setup of DSSC

Figure no 20: Experimental Setup of DSSC



$$FF = \frac{Vmpp \times Impp}{Voc \times Isc}.$$

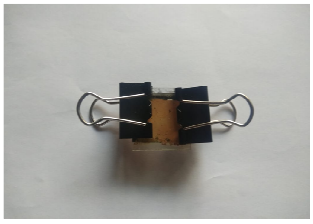
$$P_{max} = V_{oc} \times J_{sc} \times FF..$$

$$\eta = \frac{Pmax}{Pin} \times 100\%..$$

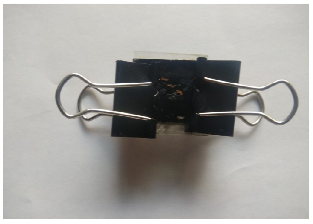
Figures no 21: IV Curve and Formulas used

Bala Gidda Flower					
		2000 m	2000µ		
Slno	Description	VOC	ISC	FF	Efficiency
1	Unknown flower 2 flower	0.54	0.46	0.64	0.351

Tabular column no 11: Efficiency of the Prepared DSSC



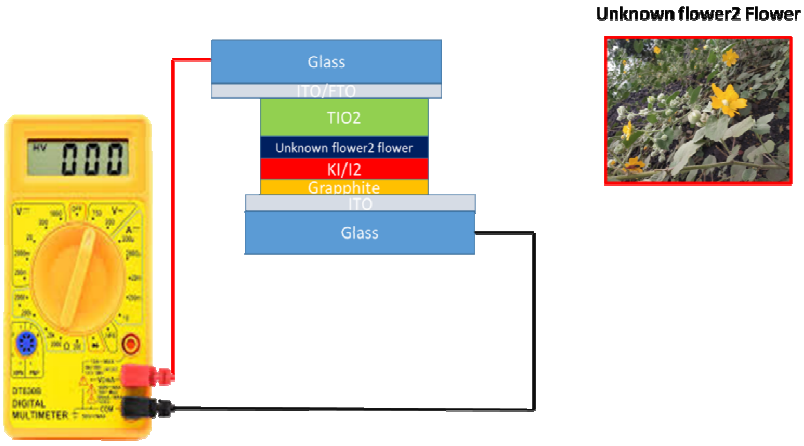
Front View



Back View

Figures no 22: Front and back view of DSSC

Figure no 23: Shows circuit diagram and Dye used and With Measuring instrument



Conclusion

The above eperiment will shows the finding of new dye for preparation of power generation this dye name in general or in local language we call it has bala gidda and this dye as under gone with different solvents used and find out the best one for

A) Best ph values measured and useful one and found better by used in Methanol solvents

B) Undergone the photo colorimeter and found these better wavelength is 67 and optical density 1.89 for linced oil

C) Components found in this is cereten in the bala gidda

D) From the optical microscope we have viewed the structures of how the coating is adhered and sticking of the dye molecules on the porous semi conductive oxide material and found good adhere and it will be very helpful to produce the electrons by the dye (bala gidda) and carriers of elections by Tio2 as semi conductive oxide material

E) The counter electrode prepared is good which is prepared by combination of (kids+i2+ethanol) is good enough and found good carrier of electrons from counter electrode and good suppliers for the dye during passed to semiconductor material for completion of circuit

F) The counter electrode with the carbon soot is also very helpful

G) The efficiency of this is 35.1 %

H) Applicable for small electrical devices

Finally we concluded that this bala gidda can be used for power generation

REFERENCE

1) M.Z.Alom,T.K.GodderandM.N.Morshed,"ASurveyof SpectrumSensingTechniques inCognitiveRadio Bouhafs, D., Moussi, A., Chikouche, A., Ruiz, J., 1998. Design and simulation of antireflection coating systems for optoelectronic devices: Application to silicon solar cells. Solar Energy Materials and Solar Cells. 52, 79-93.
2) Chandrasekar, M., Senthilkumar, T., 2015. Experimental demonstration of enhanced solar energy utilization in flat PV (photovoltaic) modules cooled by heat spreaders in conjunction with cotton wick structures. Energy, 1-10.
3) Chao, H., Hsien, S., Kun, Y., 2013. Experimental study of Photovoltaic/ Thermal (PVT) hybrid panel. International J Smart Grid and Clean Energy, 148-151.
4) Daniel, N., 2008. Anti-reflection coatings for silicon solar Cells. IFE, 1-16.
5) Gangadevi, R., Vinayagam, BK., Senthilraja, S., 2017. Experimental investigations of hybrid PV/Spiral flow thermal collector system performance using Al2O3/water nanofluid. IOP Conf. Series: Materials Science and Engineering, 197-206.
6) Kazi, I., Aaesha, A., Helmy, A., Ammar, N., 2013. ITO, Si3N4, and ZnO: Al– Simulation
7) Different Anti-Reflection Coatings (ARC) for Thin Film a-Si: H Solar Cells. IEEE, 673- 678.
8) Krauter, S., 2004. Increased electrical yield via water flow over the front of photovoltaic panels. Solar Energy Materials& solar Cells 82, 131-137.
9) Mohamed, M., 2015. Enhancing the Photoelectric Conversion Efficiency of Solar Panel by Water Cooling. J of undamentals of Renewable Energy and Applications, 240-244.
10) Mohan, K., Du, B., Eric, H., 2013. Water cooled concentrated photovoltaic system. International J of Smart Grid and Clean Energy, 159-163.
11) Nicholas, T., Wong, J., Cheng, G., 2017. Experimental study of the efficiency of the solar panel by phase change material cooling. Indian conference on Material Technology and Energy, 217-223.
12) Shenyi, W., Chenguang X., 2014. Passive cooling technology for photovoltaic panels for domestic houses. International J Low-Carbon Technologies, 118-126.
13) Taiseer, M., 2017. The efficiency of Photovoltaic Modules Using Different Cooling Methods:A Comparative Study. J of Power and Energy Engineering, 32-45.
14) Teo, H.G., Lee, P.S., Hawlader, M.N., 2011. An active cooling system for photovoltaic modules. Applied Energy 90, 309-315.
15) Xiao, T., Zhenhua, Q., Yaohua, Z., 2010. Experimental Investigation of Solar Panel Cooling by a Novel Micro Heat Pipe Array. Energy and Power Engineering 2, 171-174.
16) Y. Yang, S. Pillai, H. Mehrvarz, H. Kampwerth, A. Ho-Baillie, M. A. Green (2011),
17) Scattering Back Reflector Designs for High Efficiency Silicon Solar Cells, Proceedings
18) of the 26th European Photovoltaic Solar Energy Conference and Exhibition, Hamburg,
19) Germany. Oct. 2011.
20) Y. Yang, H. Mehrvarz, H. Kampwerth, A. Ho-Baillie, M. A. Green (2011), Novel
21) Planar Rear Surface Reflector Design for Crystalline Silicon Solar Cells,Proceedings of the 26th European Photovoltaic Solar Energy Conference and Exhibition, Hamburg, Germany. Oct. 2011.
22) Y. Yang, M. A. Green, H. Kampwerth, H. Mehrvarz, S. Pillai, A. Ho-Baillie (2011),
23) Reflected light distribution from various textured front surfaces of silicon solar cells, Proceedings of the 49th Annual Conference of the Australian and New Zealand Solar Energy Society, Sydney, Australia. Dec. 2011.
24) Y. Yang, H. Kampwerth, H. Mehrvarz, S. Pillai, A. Ho-Baillie, M. A. Green (2011),
25) Angular dependent rear internal reflection of planar back reflectors used in silicon
26) solar cells, Proceedings of the 49th Annual Conference of the Australian and New
27) Zealand Solar Energy Society, Sydney, Australia. Dec. 2011.
28) Y. Yang, S. Pillai, H. Mehrvarz, H. Kampwerth, A. Ho-Baillie, M. A. Green (2012),
29) The Effect of Rear Surface Passivation Layer Thickness on High Efficiency Solar Cells
30) with Planar and Scattering Metal Reflectors, Proceedings of the 38thIEEE Photovoltaic
31) Specialists Conference, Austin, USA, June 2012.
32) Henner Kampwerth, Yang Yang, Martin A. Green (2012), Experimental Setup to
33) Measure the Optical Scattering Properties of Solar Cell Back Reflectors, Proceedings
34) of the 38thIEEE Photovoltaic Specialists Conference, Austin, USA, June 2012. 186 Journal papers
35) Y. Yang, S. Pillai, H. Mehrvarz, H. Kampwerth, A. Ho-Baillie, M. A. Green (2012), Enhanced Light Trapping for High Efficiency Crystalline Solar Cells by the Application of Rear Surface Plasmons, Solar Energy Materials and Solar Cells, 101 (2012) 217-226.
36) Y. Yang, M. A. Green, A. Ho-Baillie, H. Kampwerth, H. Mehrvarz, S. Pillai (2012), Characterisation of 2-D Reflection Pattern from Textured Front Surfaces of Silicon Solar Cells, submitted for publication in the Solar Energy Materials and Solar Cells.
37) Y. Yang, S. Pillai, M. A. Green, A. Ho-Baillie, H. Mehrvarz, H. Kampwerth (2012),

38) Surface plasmon enhanced rear light trapping schemes for c-Silicon solar cells –
39) Effects on electrical and optical properties, submitted for publication in the Solar
40) Energy Materials and Solar Cells.
41) Y. Yang, H. Kampwerth, M. A. Green, S. Pillai, H. Mehrvarz, A. Ho-Baillie (2012), Rear reflection for silicon solar cells with dielectrically displaced reflectors, submitted for publication in the Optical Express. Investgating the effect of various extracting solvents on the potential use of red apple skin (malus domestica) as natural sensitizer for dye sensiized solar cell,Invistigation of theefficiency of dye sensitized solar cell using natural dyes as photo sensitizer
42) Electrical characterization of solar cells Sensitized with natural dye extracted from local plant as a photosensitizer Catalytic improvement on counter electrode of dye sensitized solar cells using electrospun pt nano fibres Dye sensitized solar cell with natural dyes extracted from acriote seed Anti-Solar study of ethanolic extract of leaves Moringa oleifera nanowire based dye sensitized solar cell increased power conversion efficiency of dye sensitized solar cells which counter electrodes based on carbon materials Efficient dye sensitized solar cells using red turnip and purple wild sicilian prickly pear fruits Effect of natural dye sensitizers towars towards towards the improvement of dye sensitized solar cell (DSSC)Efficiency
43) Aluminium doped sno2 hollow microspheres as photoanode materials for dye sensitized solar cells
44) Nature based from blue pea flowers as a potential sensitizer for dssc Study on nature inspired fractal design based flexible counter electrodes for dye sensitized solar cells fabricated using additive manufacturing Components,Working, Fabrication & characterization of dye sensitized and Perovskite solar cell
45) Dye sensitized solar cell fabrication : Methods and optimization to realize high power conversion efficiency for low power applications
46) Mixed dye from Nerium Oleander and Hibiscus Flowers as a Photosensitizer in dye sensitizedd solar cells
47) A dye sensitized solar cell using natural counter electrode and natural dye derived from mangosteam peel waste
48) A review on counter electrode materials in dye-sensitized solar cells
49) Aluminium doped sno2 hollow microspheres as photoanode materials for dye sensitized solar cells
50) Effect of additional HfO2 layer deposition on heterojunction c-Si solar cells Doo Won Lee1 | Muhammad Fahad Bhopal1 | Sang Hee Lee1 | Ah Reum Lee1 | Han Jun Kim1 | Malik Abdul Rehman2 | Yongho Seo2 | Kyoung-jin Lim3 | Won-suk Shin3 | Soo Hong Lee1
51) Study on nature inspired fractal design based flexible counter electrodes for dye sensitized solar cells fabricated using additive manufacturing
52) Krishnan, B. Radha, M. Ramesh, M. Selvakumar, S. Karthick, A. Sasikumar, D. Varun Geerthi, and N. Senthilkumar. "A Facile Green Approach of Cone-like ZnO NSs Synthesized Via Jatropha gossypifolia Leaves Extract for Photocatalytic and Biological Activity." JOURNAL OF INORGANIC AND ORGANOMETALLIC POLYMERS AND MATERIALS (2020).
53) Beemaraj, Radha Krishnan, Mathalai Sundaram Chandra Sekar, and Venkatraman Vijayan. "Computer vision measurement and optimization of surface roughness using soft computing approaches." Transactions of the Institute of Measurement and Control (2020): 0142331220916056.
54) Krishnan, B. Radha, and M. Ramesh. "Optimization of machining process parameters in CNC turning process of IS2062 E250 Steel using coated carbide cutting tool." Materials Today: Proceedings 21 (2020): 346-350.
55) Parthiban, A., A. Mohana Krishnan, B. Radha Krishnan, and V. Vijayan. "Experimental Investigation of Mechanical and Wear Properties of AL7075/Al 2 O 3/MICA Hybrid Composite." Journal of Inorganic and Organometallic Polymers and Materials (2020): 1-9.
56) Dr. Radha Krishnan B, Ph.D, Dr. Harikishore S, and Dr. V. Vijayan, Wear Behavior of B4C reinforced Al6063 matrix composites electrode fabricated by stir casting method (2020).Transactions of the Canadian Society for Mechanical Engineering DOI: 10.1139/tcsme-2019-0294.
57) Karthikeyan, N., B. Radha Krishnan, A. VembathuRajesh, and V. Vijayan. "Experimental analysis of Al-Cu-Si metal matrix composite by powder-metallurgy process." Materials Today: Proceedings (2020).
58) Sanjeevi, R., G. Arun Kumar, and B. Radha Krishnan. "Optimization of machining parameters in plane surface grinding process by response surface methodology." Materials Today: Proceedings (2020).
59) Sanjeevi, R., R. Nagaraja, and B. Radha Krishnan. "Vision-based surface roughness accuracy prediction in the CNC milling process (Al6061) using ANN." Materials Science 2214 (2020): 7853.
60) Veluchamy, B., N. Karthikeyan, B. Radha Krishnan, and C. Mathalai Sundaram. "Surface roughness accuracy prediction in turning of Al7075 by adaptive neuro-fuzzy inference system." Materials Today: Proceedings (2020).
61) Giridharan, R., A. Vennimalai Rajan, and B. Radha Krishnan. "Performance and emission characteristics of algae oil in diesel engine." Materials Today: Proceedings (2020). (Scopus Indexed)

62) Radha Krishnan, B., Vijayan, V., Parameshwaran Pillai, T. and Sathish, T., 2019. Influence of surface roughness in turning process—an analysis using artificial neural network. Transactions of the Canadian Society for Mechanical Engineering, 43(4), pp.509-514.
63) Krishnan, B. Radha, and M. Ramesh. "Experimental evaluation of Al-Zn-Al2O3 composite on piston analysis by CAE tools." Mechanics and Mechanical Engineering 23, no. 1 (2019): 212-217.
64) Krishnan, B. R., V. Vijayan, and G. Senthilkumar. "Performance analysis of surface roughness modelling using soft computing approaches." Applied Mathematics and Information Sci 12, no. 6 (2018): 1209-1217.
65) Kumar, N. Saran, N. Kaleeswaran, and B. Radha Krishnan. "Review on optimization parametrs in Abrasive Jet Machining process." International Journal of Recent Trends in Engineering and Research 4, no. 10 (2018): 2455-1457.
66) BR Krishnan, M Ajith, RA kumar, P Bala, GG Maurice, "Determination of Surface Roughness in AA6063 Using Response Surface Methodology". International Research Journal of Engineering and Technology 5 (3), 2556-2558
67) Radhakrishnan, B., P. Ramakrishnan, S. Sarankumar, S. Tharun Kumar, and P. Sankarlal. "Optimization of CNC machining parameters for surface roughness in turning of aluminium 6063 T6 with response surface methodology." SSSG international journal of mechanical engineering–(ICCRESt 17), Specia issue 23 (2017).
68) Krishnan, B. Radha, R. Aravindh, M. Barathkumar, K. Gowtham, and R. Hariharan. "Prediction of Surface Roughness (AISI 4140 Steel) in Cylindrical Grinding Operation by RSM." International Journal for Research and Development in Technology 9, no. 3 (2018): 702-704.
69) KRISHNAN, B. RADHA, and K. ARUN PRASATH. "Six Sigma concept and DMAIC implementation." International Journal of Business, Management & Research (IJBMR) 3, no. 2, pp: 111-114.

70) Krishnan, B. Radha. "Review Of Surface Roughness Prediction In Machining Process By Using Various Parameters." Int. J. Recent Trends Eng. Res.(IJRTER) 6, no. 1 (2020): 7-12.
71) Krishnan, B. Radha, C. Mathalai Sundaram, and A. Vembathurajesh. "Review of Surface Roughness Prediction in Cylindrical Grinding process by using RSM and ANN." International Journal of Recent Trends in Engineering and Research 4, no. 12 (2018): 2455-1457.
72) Sundar, S., T. Sudarsanan, and Radha Krishnan. "Review of Design and Fabrication of four wheel Steering system." International Journal of Recent Trends in Engineering & Research (IJRTER) 4, no. 10 (2018): 1034-1049.
73) Radhakrishnan, B., Sathish, T., Siva Subramanian, T.B., Tamizharasan, N. and VarunKarthik, E., 2017. Optimisation of Surface Roughness in CNC Milling Process Using RSM. SSRG International Journal of Mechanical Engineering-(ICRTECITA-2017)