

Optimism system refrigerator hybrid power (solar cell + actuator motor) to traditional fisherman boat in Makassar

Soetyono Ch. Iskandar¹, Lahming M.S² and Muhsin Z³

Makassar State University

ABSTRACT: Research of Pre-eminent Donation of This college aimed at energetic refrigerator system planning of hybrid (solar cell + actuator motor) at inclusion ship of fish in coming, principal from this research is, exploiting of dissociation energy of diatomic is newest with usage of diesel fuel technology cell as coolant system actuator at actuator motor plus fisherman ship. This research program planned in a period of three years to design freezing device of energetic fish of hybrid (solarcell + actuator motor) fisherman ship, yields storage device basis barium product of energetic fish of hybrid. In first year, does with refer to study study about base material refrigerator and solar cell and makes energetic refrigerator system prototype of solar (laboratory scale). In second year, does study to design energetic refrigerator of hybrid (solar cell + actuator motor) with laboratory scale productively energetic refrigerator prototype of hybrid with laboratory scale. In third year, application of energetic refrigerator system of hybrid (solar cell + actuator motor) at fisherman ship Poetere in Makassar, expected can push and motivates fisherman public in developing and applies this technology, causing can increase quality of produce of fish and at the same time increases fisherman public economics value without using again ice block to make cool fisherman fishing boat hold.

Keyword: Hybrid, Solar Cell, Actuator Motor, Refrigerator, Economy Value

I. INTRODUCTION

1.1 Background

Dissociation energy of diatomic has important role in attainment of purpose of social, economics, and area for sustainable development, and is supporter for national economic activity. Usage of dissociation energy of diatomic in Indonesia increases is fast in line with economic growth and resident increase. To fulfill requirement of dissociation energy of diatomic that is the increasing, developed various alternative dissociation energy of diatomics, among others dissociation energy of diatomic is newest (solar cell) till now has not many exploited.

Solar cell is one of dissociation energy of diatomic is being impetuous is developed is the existing by the Government of Indonesia because as tropical state, hence solar energy potency that is big enough. Based on irradiation data of the sun mustered out of 18 locations in Indonesia, solar radiation in Indonesia can be classified as follows: for occidental area and Indonesia east with distribution of irradiation in KBI around 4,5 kWh/m²/hari with various monthly around 10%; and in KTI around 5,1 kWh/m²/hari with various monthly around 9%.

Exploiting of solar cell by the way of radiation energy conversion of sunlight becomes electric energy. Sunlight energy conversion becomes electric energy can be done with usage of solar cell or solar cell or called as with fotovoltaik. Usage of fotovoltaik actually have been long enough been applied in its bearing to get electric energy like compilation of conventional panels at part of roof and or compilation in an wide area for Solar Energy Alternator (SEA).

Fishery potency of deconvolution Indonesia spread over all part of water territories of the Indonesia sea like at water territory of sea teritorial, water territory of sea Nusantara and water territory of sea Zona Economy Exclusive (ZEE). Water territory wide of Indonesia sea is estimated by 5,8 million km² with longest coastline in world 81000 kms and islands bunch 17508, has fish potency estimated there is 6,26 million tons pertahun which can be managed everlastingly with detail of 4,4 million tons can be caught in water territory of Indonesia and 1,86 million obtainable tons from water territory ZEEI.

Problems of traditional fisherman especially fieldsman fisherman, still using hold with ice block media as haul fish preserver media. Beside applies big cost, also requires big storage space. While at itself ship, very possibly panels solar at its roof. So enables scheme and making of energetic refrigerator of hybrid. Dissociation energy of diatomic yielded by solar panel hardly depend on weather and absorption time of dissociation energy

of diatomic which only happened in the day time. Therefore, need to be done research of dissociation energy of diatomic hybrid (solar cell + actuator motor) as dissociation energy of diatomic for refrigerator at traditional fisherman ship.

1.2 Output

From research of Optimalisasi energetic refrigerator system of hybrid (solar cell + actuator motor) to traditional fisherman ship in Makassar, hence exterior which will be reached in this research as, energetic refrigerator system model of hybrid (solar cell + actuator motor) either real laboratory scale and also scale, yields American Journal of Engineering Research And Development, Article, University Handing Out, teaching book Deepublish, and HKI (patent).

1.3 Research Urgency

Research of Pre-eminent Donation of This college aimed at energetic refrigerator system planning of hybrid (solar cell + actuator motor) at inclusion ship of fish in coming, principal from this research is, exploiting of dissociation energy of diatomic is newest with usage of diesel fuel technology cell as coolant system actuator at actuator motor plus fisherman ship. Fisherman ship at the moment, still using hold as haul repository by using ice block.

Limitation of hold technology by using ice block, has insufficiency between it, implication to limited inclusion time because ice block durability insufficient stripper, not its continuant result of fish response, so that ice block at hold is not applied, the happening of decrement of volume at hold, because its potting is occupied by ice block and hold temperature unmatched to requirement.

So lacking of hold by using ice block can be to with merancangan energetic refrigerator of solar. energetic Refrigerator of solar also has constraints for example source of solar temperature is not continuant, because hardly depend on weather. This constraint, overcome hybrid with actuator motor at fisherman ship. So this research designs energetic refrigerator system of hybrid (solar cell + actuator motor) to eliminate usage of ice block at hold.

With energetic refrigerator system adjustment of technology of hybrid (solar cell + actuator motor) to eliminate usage of ice block at hold, expected increases earnings of fisherman public economics. So didn't depend on again at availability of ice block. Produce of refrigerating machine usage precise technology, in place which has not applied State Electrical Company (SEC).

II. REVIEW LITERATURE

To build a solar cell system photovoltaic which can operate carefully hence required by some principal compiler components of inter alia, solar cell, Universal of Charge Controller (UCC), inverter and battery. Solar cell or in more knowledgeable international world as diesel fuel cell or photovoltaic cell, be a divais intrinsic semiconductor having expanse and consisted of diode circuit type p and nitrogen, capable to change sunshine dissociation energy of diatomic to become electric energy. (Yulianto, 2006).

Solar cell is compiled by merging type silicon p and type n. silicon type p is silicon is having the character of positive effect of lacking of electron while silicon nitrogen type is silicon is having the character of negativity effect of excess of electron when receiving solar radiation (in the form of photon) at both (silicon type p and n) formed positive (hole) and negativity (electron). This illustration presented at Figure 1 (Abu Bakardkk, 2006).

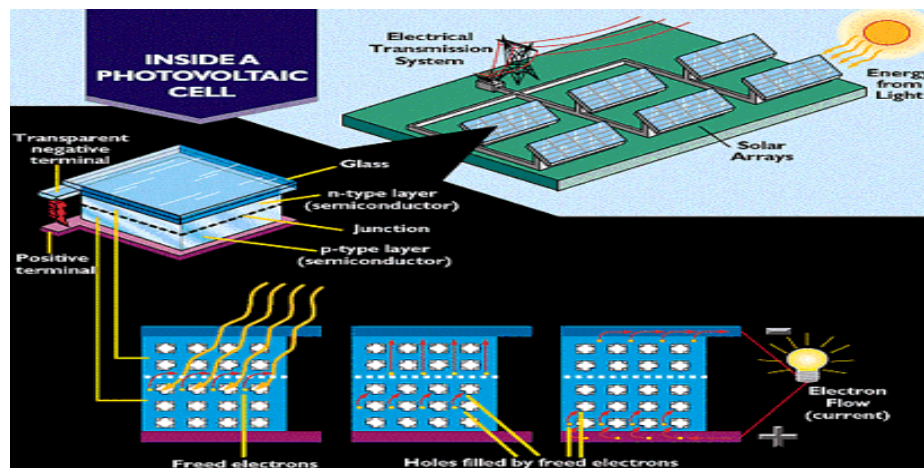


Figure1. Photovoltaic Cell work principle.

Solar cell system photovoltaic which is common used for lighting is individual system or which a more regular is recognized by the name of solar Home system (SHS)

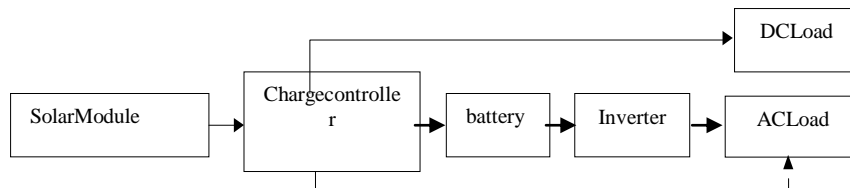


Figure2. Module solar system Block Diagram

From figure 2. explained that sunshine dissociation energy of diatomic converted to become electric energy by module will be channelled to charger control to arrange impregnation of electric energy at battery. From this charger controller can also directly applied for payload DC or directly enter to inverter to be altered to become current AC. Hereinafter electric energy yielded by battery will be converted by inverter from direct current (DC) becomes alternating current (AC) causing can be exploited at payload.

Condition of meteorology that is most dominant in system design SHS is level of daily radiation ($\text{Wh/m}^2\text{hari}$), and temperature around, while humidity and wind velocity is not too much having an effect. (Abu Bakardkk, 2006).

To calculate power capacities photovoltaic required, would hardly depended from pressure dissociation energy of diatomic required and radiation of available daily the sun in location. According To SNI 04-6394-2000, defined that dissociation energy of diatomic which must to fulfill dissociation energy of diatomic required by payload hence daily exterior dissociation energy of diatomic of circuit average of having to be added dissociation energy of diatomic losing in system equal to 25% from daily exterior dissociation energy of diatomic of mean.

imitation of Irradiation of the sun that is is not shining light each day can be overcome by using battery. So later electric energy yielded by solar cell can be kept in battery and applied for requirement between two lights. From research result done gets data that solar cell yields strongest electric current for supply at 12 - 13 noons with angle of optimum dip equal to 15° . (Ariawan, 2008).

At some this centuries stock of petroleum as principal energy source of world has is thin along with the many requirement of petroleum for activities of economics wheel and also for other activities. Therefore at the present day this exploiting of sunshine dissociation energy of diatomic as energy source alternative of has many applied in the world..

Machine powered ship of friendliness area of earning energetic of actuator hybrid, for example solar energy, wind power and diesel engine. Carriage hybrid (gasoline engine combination trap or diesel with electrical generator/motor) more and more day more and more many in roads, as well as enabling at ship which its(the mainspring hybrid (combination trap between mixtures hydrogen as component of solar cell " Solar cell Panels" and wind power turbine). " Solar Panels" will collect sunshine and changes it becomes electricity also wind feathering turbine changing it to become electric current.

Various researchs related to expansion of energy hybrid, between it, LiaMulianidkk (2003), does research with title " Mini scheme of refrigerator solar cell," one of the application of solar cell is for mini coolant serve the purpose of storage, for food storage, vaccine, fish or other material required low temperature. Scheme of mini coolant (mini of refrigerator) solar cell with electrical thermo system applies module peltier.

Pedersen PH., et. al (2004), " Solar Chill - a Solar PV Refrigerator without Battery", An energetic refrigerator of solar (Solar Chill) has been developed in an international project entangling Greenpeace International, GTZ, UNICEF, UNEP, WHO, industrial partner and Institut Technology Denmark. Refrigerator can operate directly at panel PV solar, without battery or attachment electronic, and therefore suited for location where a few reliable keepings and operation. Purpose of principal of Proyek Solar Chill is to assist for rural poor public. Solar Chill doesn't apply fluorocarbons in system.

Whereas Pramudya I S and I Ketut Aria P.U. (2012), does research with title " Initial Study of Expansion of Katamaran Fishing Boat with Penggerak Hybrid", where fishing boat technology grows at full speed, more and more scarce and expensive of fossil fuel is anticipated with sailresurecting and recognition of form of friendly alternative dissociation energy of diatomics of area, like exploiting of solar energy in the form of solar cell and exploiting of sea wave energy with system so-called wave-power mechanism.

Yulianto T., dkk, (2012), does scheme of ship with title " Ship similar design hybrid Trimaran which efficient and is reliable," presents propulsion system hybrid at ship trimaran. Scheme of system propulsion hybrid is started with determination of ship resistance trimaran and stability line which good to ship Trimaran. Scheme of propulsion system hybrid through solar cell system combination trap, and fuel engine.

If compared to conventional refrigeration system, in principle there is no except to difference how fluid can be boosted up its(the boiling point causing moisture can (condensation) at condenser. At ordinary system using electrical input, this boiling point reached by using mechanic compression. At coolant system using hybrid (solar cell + actuator motor), this boiling point reached with compression thermal.

At this process, the sun temperature dissociation energy of diatomic input at generator replaces electric energy input at compressor. Because it is not continue solar energy, hence can be overcome with ship actuator motor couples with compressor at refrigerator solar cell, so that in mentioning refrigerator energy hybrid (Solar Cell + Actuator motor).

III. RESEARCH BENEFIT

With application of energetic refrigerator of hybrid (solar cell + actuator motor) at fieldsman ship in coming, hence expected to eliminates usage of ice block at hold, and increases earnings of fisherman public economics. So didn't depend on again at availability of ice block.

Side that, exploiting of dissociation energy of diatomic is newest with usage of solar cell technology cell as coolant system actuator at fisherman ship. Hence can give some advantages between it ;

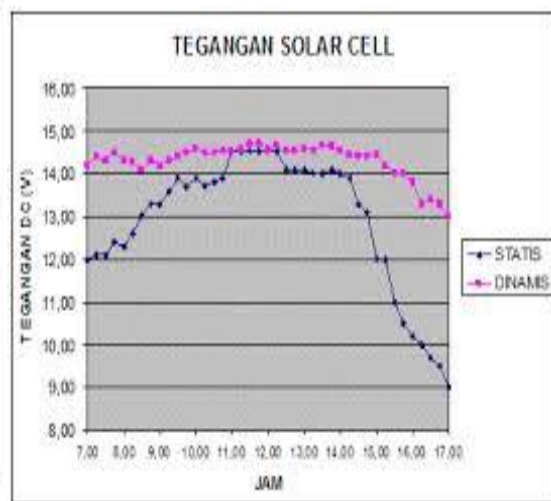
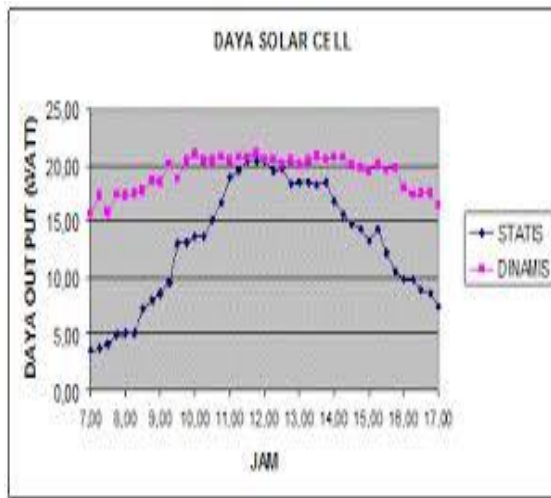
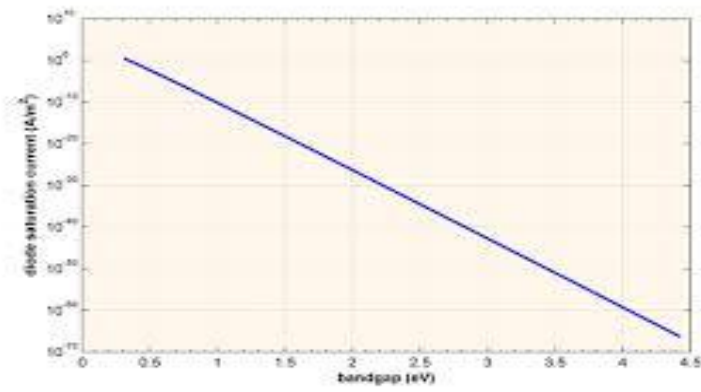
- Inclusion time of fish didn't depend on again with ice block durability which in brings, causing earns is longer lived in middle gone out to sea and result of response can yield bigger.
- Shall no longer apply ice block at hold, so that number of durabel and more obtainable fishes.
- Fish response quality of earning is more well guaranteedly is compared to applies hold with ice block base material.

This research also gives contribution to expansion of newest dissociation energy of diatomic which the application of his is till now still be limited in Indonesia, especially solar cell.

IV. RESULT and SOLUTION (EXECUTION)

Wiring; Testing Beginning April 2016





Calculation of Need of power

Housing lighting: 10 lamps CFL @ 15 watt x 4 hours(o'clock one day = 600 watts hours.

Television 21": @ 100 watts x 5 hour(clock one day = 500 watts hours

Refrigerator 360 litres : @ 135 watts x 24 hours x 1/3 (because compressor refrigerator is not living, generally they work a more regular if a more regular refrigerator is opened by ingate) = 1080 watt hours

Computer : @ 150 Watt x 6 hours = 900 watt hours

Pump and the others = 400 watt hours

Requirement total of power = 3480 watt hours

Calculation of Number Of Solar Panels

Number of solar cells panel required, one panels we are calculate 100 watt (calculation is 5 hours solar cell maximum)

Requirement of solar cells panel : (3480 / 100 / 5) 7 solar panel.

Calculation of Number Of Batteries

Number of requirement of battery 12 Volt with each 100 Ah:

Requirement of battery minimum (battery only be applied for 50% accomplishment of electrical requirement), thereby requirement of power we multiply 2 x fold : 3480 x 2 = 6960 watt hours = 6960 / 12 volt / 100 Amp = 6 battery 100 Ah.

requirement of Battery (with consideration can serve requirement of 3 sunshine no day) : 3480 x 3 x 2 = 20880 watt hours = 20880 / 12 volt / 100 Amp = 17 batteries 100 Ah

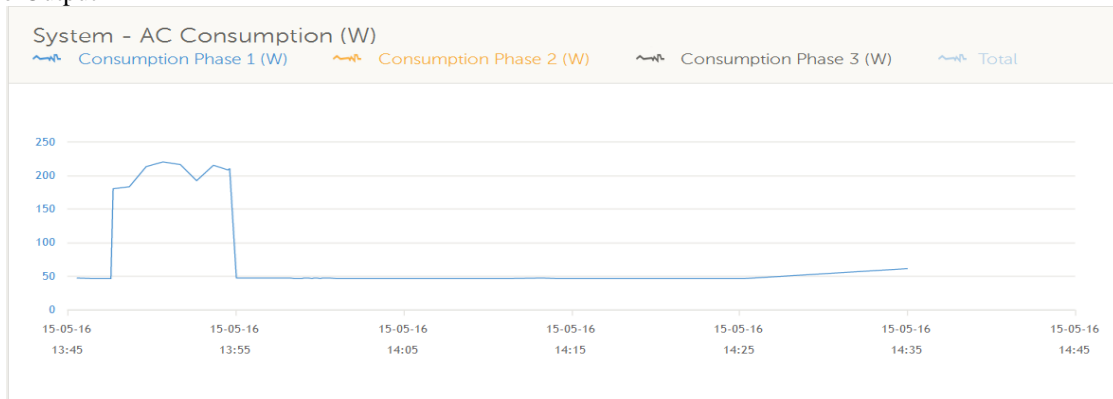
Experiment:

1 pc of fan 40 Watt

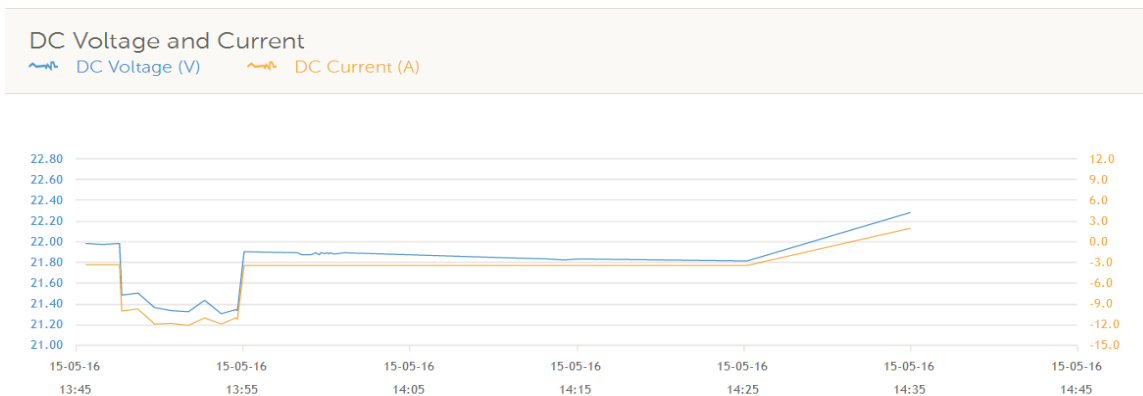
1 pc table lamp 10 Watt

1 pc water pump 115 Watt, with result which seen at graph following; at May, 15, 2016

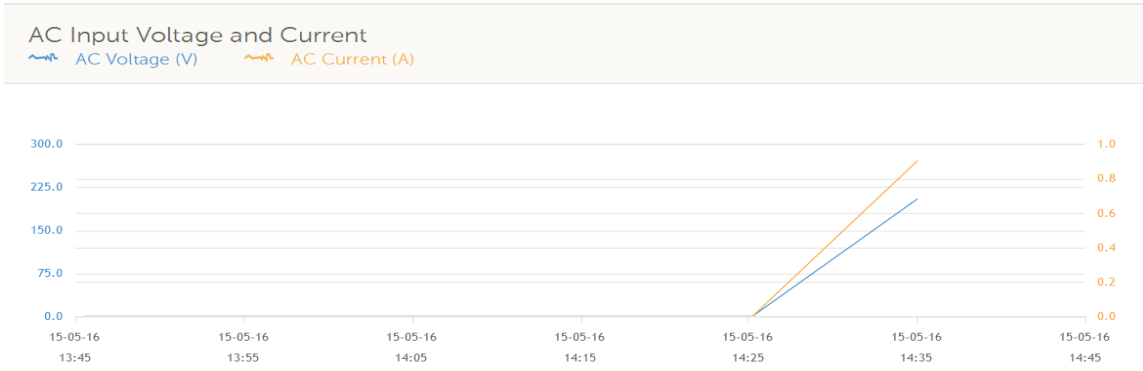
PowerOutput



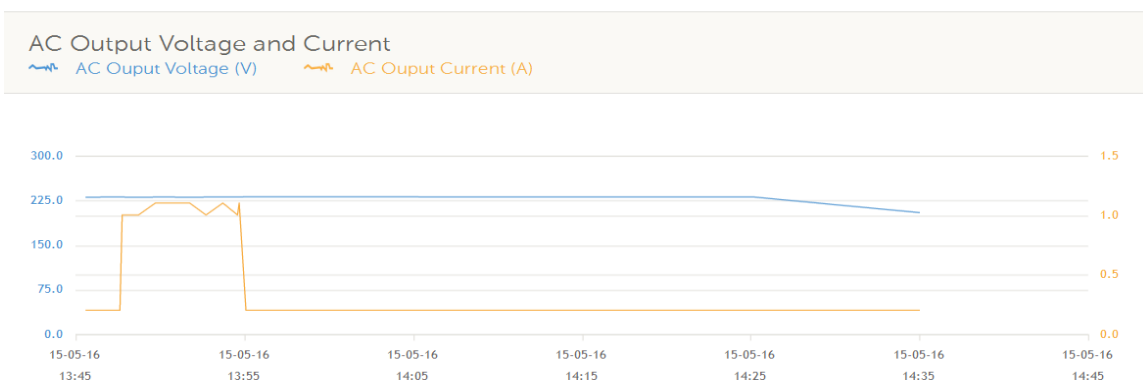
Status battery



Status Input AC



Status Output AC



Status Victron

<p>Soetyono-UNM Last update: less than a minute ago</p> <p> Consumption You are using 61 W</p> <p> State of charge Charging, 97%</p> <p> VE.Bus Status Charging, 22.28 V</p> <p> Makassar, ID 34.0°C</p>	<p>VE.Bus Summary System Bulk</p> <p>AC Input 203.9 VAC 0.9 A 134 VA</p> <p>AC Output 203.9 VAC 0.2 A 61 VA</p> <p>DC 22.28 V 1.9 A</p> <p>Hours of AC in 0.06 hours</p>
---	--

REFERENCES

- [1]. Arismunandar, Wiranto. 1985. *Teknologi Rekayasa Surya*. Jakarta: PT. Pradnyaparamita
- [2]. Ariawan, Pratama Risqi. 2008. *Studi Awal System Hybrid Antara Diesel Engine Dengan Solar Cell Pada Kapal Penangkap Ikan*.
- [3]. Abubakar, Lubis dan Sudrajat, Adjat. 2006. *Listrik Tenaga Surya fotovoltaik*. Jakarta: BPPT PRESS
- [4]. Bejan A., 1995. *Convection Heat Transfer*. John Wiley & Sons, New York, 2nd edition. This book makes good use of scaling arguments.
- [5]. Cao, Fei, dan Liejin Guo. 2011. *Simulation of fast peds solar chimney power plant in Lanzhou*. ELVESIER

- [6]. D. R. Poirier and G. H. Geiger, 1994. *Transport Phenomena in Materials Processing*. The Minerals, Metals & Materials Society, Warrendale, Pennsylvania. A comprehensive introduction to heat, mass, and momentum transfer from a materials science perspective.
- [7]. Fauzi, Farit. 2009. Pemanfaatan Sel Surya Sebagai Catu Daya Peralatan Penerangan Kapal Di Kapal Tanker.
- [8]. M. Kaviany, 1995. *Principles of Convective Heat Transfer*. Springer-Verlag, New York. This treatise is wide-ranging and quite unique. Includes multiphase convection.
- [9]. Mudjiono, Urip. 2003. Thesis-Penentuan Kapasitas Dan Alternatif Sistem Pengisian Battery Pada Propulsi Elektrik Kapal Selam.
- [10]. Mulyono, Agus. 2007. *Cahaya Di Atas Cahaya Kajian Cahaya Perspektif Fisika dan Tasawuf*. Malang: UIN Press.
- [11]. Muliani L., Sugandi G., Herlia E. (2003), "Perancangan Mini Refrigerator Tenaga Surya" Seminar Nasional Pengembangan Program R&D Mikroelektronika dan Aplikasinya. Bandung.
- [12]. Pedersen P.H., et. al (2004), "Solar Chill - a Solar PV Refrigerator without Battery", Danish Technological Institute P.O.Box 141 2630 Taastrup. Eorosun. Denmark
- [13]. Pramudya I. S. dan I Ketut Aria P.U. (2012), "Studi Awal Pengembangan Kapal Kakan Katamarandengan Penggerak Hybrid", Seminar Nasional Kedaulatan Pangan dan Energi. Fakultas Pertanian. Universitas Trunojoyo Madura
- [14]. Pudjanarsa, Astu. 2006. *Mesin Konversi Energi*. Yogyakarta: ANDI OFFSET.
- [15]. Soetyono, (2014). "Perpindahan Panas." Deepublish, Yogyakarta.
- [16]. Yulianto T., dkk, (2012). "Rancang Bangun Kapal Hybrid Trimaran yang Handal dan Efisien" Disajikan 29-30 Nop 2012. Prosiding InSINas 2012.