iJRASET
International Journal For Research in Applied Science and Engineering Technology

INTERNATIONAL JOURNAL FOR RESEARCH

IN APPLIED SCIENCE & ENGINEERING TECHNOLOGY

Volume: 3 **Issue:** II **Month of publication:** February 2015

DOI:

www.ijraset.com

Call: 08813907089 | E-mail ID: ijraset@gmail.com

ISSN: 2321-9653
International Journal for Research in Applied Science & Engineering Technology (IJRASET)

Solar Botanic Trees Using Nanoleaves

A Energy Harvesting Production

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Abstract— Solar Botanic will introduce artificial trees that make use of renewable energy from `the sun and wind, they are an efficient clean and environmentally sound means of collecting solar radiation and wind energy. Here at Solar Botanic, they have amassed a wealth of information relating to Solar Botanic Trees and Nanoleaves and the field of photovoltaic, thermo voltaic and piezoelectric technology. We will be amazed how efficient these Trees are, how they make use of light, heat and wind and turn it into useable electricity for your home or car etc. Sun, wind, water, earth and life touch our living senses immediately always, everywhere and without any intervention of reason. They simply are there in their unmatched variety, moving us, our moods, memories, imaginations, intensions and plans. To capitalize on the wealth of designs and processes found in nature, engineering and technology gave us the ingredients, creative thinking, and unique solutions made it possible to bring all this together into a natural looking leaf – the Nanoleaf.To complete the tree for multi energy exploitation, the petiole twigs and branches are incorporated with nano piezo-electric elements. Basically, a nanoleaf is thin like a natural leaf.
Keywords—photovoltaic, thermovoltaic, piezoelectric, nanoleaf

I. INTRODUCTION

London-based SolarBotanicis bringing the art of the fake Christmas tree to solar power. We've written quite a bit about solar trees in the past, but previous designs were more like trees in concept than in appearance — carports, streetlights, and more extravagant designs. Solar Botanic, however, plans to stretch biomimetics to the limit by producing solar powered trees that actually looking like trees —leaves, trunk, and all. Solar Botanic Trees would have "Nanoleaves" that convert solar power into electricity. Now, before I go any further, I can't help but express my humble opinion that fake plastic trees are not the best way to transform our urban landscapes. Solar nanotechnology has wide-ranging potential. Using such technology, power producing solar products could be applied to just about any surface downtown or anywhere. So why the need for rows of plastic trees lining our boulevards?

Two reasons:-For one, and this is really neat. Secondly, these solar trees could offer frequent plug-in stations for the electric vehicles and hybrids of the near and distant future.

A. Solar electricity generation

Solar Botanic's Nanoleaves create electricity in three ways:

1) Nano-photovoltaic generators in the leaf directly convert solar energy to electricity.

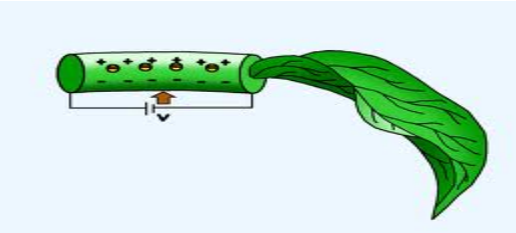

Figure 1. A general nano-photovoltaic generator

2) Nano-thermoelectric cells convert solar heat to electricity.

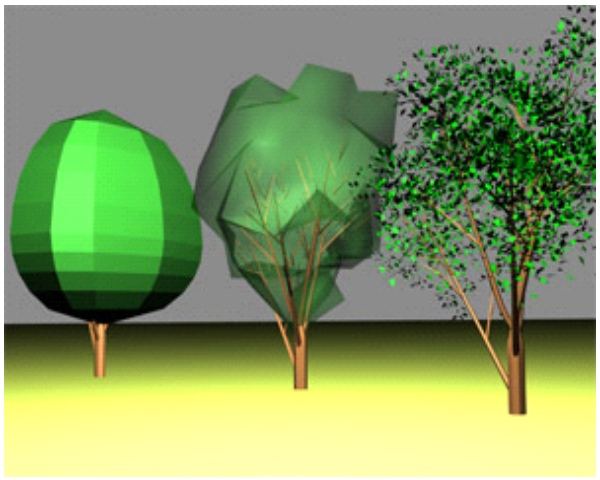

Figure 2. Thermo-electric cells enriched into it.

3) Nano-piezoelectric generators can also convert wind energy into electricity.

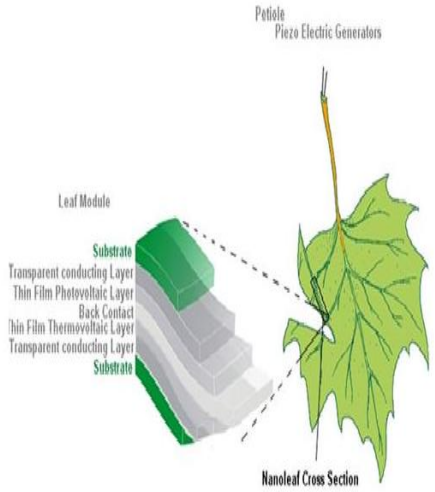

Figure 3. A common usage of piezo-electric generotor

According to Solar Botanic, this concept of energy production (given a tree canopy of 20 feet in diameter) will produce enough electricity to power the average home, producing 120,000 kWh over a two decade life span.Solar Botanic Trees would come as broad leaf trees (producing3500-7000 kWh/year), Evergreen trees (2500-7000 kWh/year) or as shrubs, plants, roof, wall "carpets" and fencing. Solar Botanic was founded last year and as yet has no working model to show off, which means their rather revolutionary product is still untested. I really like the idea of converting light, heat, and wind energy simultaneously and we'll have to wait and see if their idea pans out. But I don't see it as very necessary, assuming the ultimate success and full-potential-realization of solar nanotechnology in general. Let us not forget the awesome power and necessity of really-real trees — the ones that digest all that extra carbon floating around — in our cities and towns.

Fake plastic trees just seem too involved. Take production; how do you roll a 20 foot wide tree off an assembly line at an

affordable price? Secondly, as I mentioned earlier, more integrated products such as solar windows, paint or siding would make better use of space and material. A beautiful idea, but necessary? A relatively modern technology uses nanoleaves attached to artificial trees and plants to capture solar energy. These exclusively designed nanoleaves contain tiny photovoltaic and thermo voltaic modules that gather heat and light from solar energy, converting this to electrical energy. Solar power and wind power is seen by many as a soln. to the world's energy problems. The earth receives 1.7 W from the sun compared to total electricity generation capacity of 4.6 W. However typical com. available modules have an energy conversion efficiency of less than 12%.

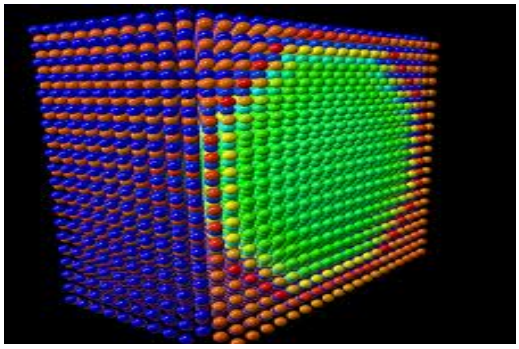

Figure 4. Molecular structure of a silicon cell.

Silicon cells with 24% efficiency have been produced in the lab while multi-junction tandem cells using different semiconductor materials (GaInAs, GaInP and Ge) to absorb different parts of the sun's spectrum have reached 40%.The possibility of using quantum slicing and multiple exciton generation to make more efficient use of high energy photons is considered and impurity band generation possible route to use low energy photons. One of the greatest challenges is to do this cheaply using semiconductors made from non-toxic abundant elements. Nanoleaf technology is an inventive method of green energy collection, combining the conversion of light, heat and wind power. Integrated nano technologies enable the nanoleaves to convert solar radiation (light & heat) into electricity.Furthermore, the leaf petiole or the stem, and twigs comprise nano-piezovoltaic material -- these tiny generators produce electricity from movement or kinetic energy caused by wind or falling raindrops. A fundamental flaw in conventional solar cells is that electrons give too much energy by sunlight and lose that energy in heat form, as the electrons move thermally to the bottom of the conduction band. SolarBotanic "hot carrier" solar cells would use quantum dots (i.e., nano-particles) to confine electrons long enough so that they could be extracted before their energy dissipates as heat. With this process of combining the conversion of light, heat and wind, more energy is generated, as the "hot carrier" can now be efficiently used with the implementation of thermovoltaic cells.The design of the nanoleaves is based on the principles of photosynthesis, a natural process where plants extract the light from solar energy, and along with CO2 from the atmosphere, convert it to starches and oxygen, the oxygen being emitted to the atmosphere.However, nanoleaves development has gone a step further, in that they are capable of harvesting the thermal and light energy from the sun‟s energy and convert it to electricity. The stems of the nanoleaves are designed to collect kinetic energy from the wind, which they also convert to electrical energy.

II. METHODOLOGIES

Instead of causing problems for the environment with the abundance of carbon footprint, we should come up with some practical solution to clean up the mess and that is why clean energy sources have become appealing. Solar power keeps the surroundings cleaner and healthier. Photovoltaic cells that hardness the solar power is an attractive option for capturing light and generating electric power. Various designers have implemented this PV technology in their designs and have created solar trees that amount to generation of cleaner electricity in an eco-friendly way.

Solar nano technology is used to collect thermal, light, and wind energy, the leaves and stems incorporate minuscule cells, as explained below,

A. Thermal Energy

This is captured through the use of thermo voltaic (TV) cells which convert thermal energy into electricity by using semi-

conducting materials (a material which is between a metal and an insulator; its conductivity increasing with temperature rise).

B. Light Energy

Light energy is captured by the use of photovoltaic cells (PV), which convert the energy inherent in solar light rays into electricity.

C. Kinetic Energy

The kinetic energy contained in wind causes the nanoleaf stems, twigs, and branches to oscillate. This motion is captured by piezovoltaic (PZ) cells using a semi-conductor device embedded in these components, converting the kinetic energy of the wind to electrical energy.

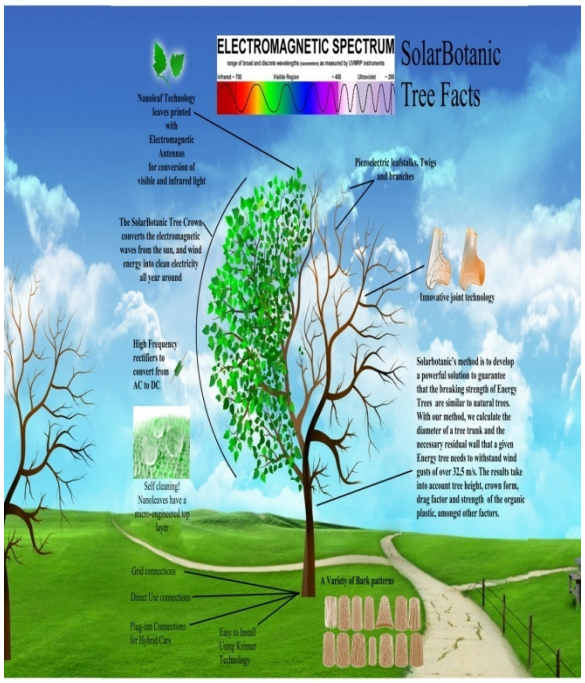

Figure 5. Schematic representation of a complete solar-botanic tree.

D. Tio2

The nano leaves are designed by using the tio2 nano particles because it's very effective power generating nano particles and cost is very less. So in cosmetic and skin care products, titanium dioxide is used as a pigment, sunscreen and a thickener. It is also used as a tattoo pigment and in styptic pencils. Titanium dioxide is produced in varying particle sizes, oil and water dispersible, and with varying coatings for the cosmetic industry. This pigment is used extensively in plastics and other applications for its UV resistant properties where it acts as a UV absorber, efficiently transforming destructive UV light energy into heat. Titanium dioxide is found in almost every sunscreen with a physical blocker because of its high refractive index, its strong UV light absorbing capabilities and its resistance to dis-colouration under ultraviolet light. This advantage enhances its stability and ability to protect the skin from ultraviolet light. Sunscreens designed for infants or people with sensitive skin are often based on titanium dioxide and/or zinc oxide, as these mineral UV blockers are believed to cause less skin irritation than other UV absorbing chemicals. The titanium dioxide particles used in sunscreens have to be coated with silica or alumina, because titanium dioxide creates radicals in the photo-catalytic reaction. These radicals are carcinogenic, and could damage the skin

III. LATEST TECHNOLOGY OF OUR NANOLEAVES

The Nano tree is a combination of high Tec materials brought together in a leaf design to convert all 3 energy sources; Light, Heat and Wind into electricity, our trees are a quantum source of power and an excellent electricity provider.

IV. APPLICATIONS OF ELECTRICAL ENERGY FROM NANOLAEVES

The photovoltaic, piezovoltaic and thermo voltaic energy harvesters are linked to individual junction boxes, from where they are amalgamated and fed collectively into an inverter. This converts the electricity from Direct Current (DC) into Alternating Current (AC) the electrical power now being suitable for domestic or industrial use. The manufacturers of the system estimate that a six meter area of nanoleaves canopy will generate enough electrical power to supply an average household.

There are many places were the artificial trees and shrubs can be positioned as noted below;

A. Deserts

The power supplied by these trees “planted” in the desert can be used to power desalination plants to produce fresh water from seawater and brackish water aquifers. This water can then be used for drinking and land irrigation, without any environmental damage to the fragile desert environment.

B. Golf courses

The electricity produced can be used to charge electrically powered ground maintenance vehicles such as grass cutters as well as electrically powered hand tools like grass trimmers and pruning shears. When planted on golf courses the power produced can be used to charge golf buggies as well as electrically powered ground maintenance vehicles.

C. Office Car Parks and Industrial Units

Trees planted in these locations will not only supply electrical power for the office and industrial units, but add aesthetic qualities to an otherwise drab area, whilst providing shade from the wind and sun.

D. Electree

Solar-powered Tree to charge your mobile devices and solar-powered tree lights up the night.

V. OVERVIEW

Nano tree will be multifunctional, efficient, renewable energy systems. Within our collection, you'll find a host of will be top quality multi energy collectors with maximum power output day and night that are installed by our contractors. The energy trees range from 2.000 to 12.000 kWh per year power output, so you can find the right tree, shrub or plants with the right features at the right price. Nano tree are designed and engineered for use in all areas and to withstand extreme weather conditions, they will comply with safety regulations that vary from area to area. Every nano tree is engineered for superior performance, maximum power efficiency and long-lasting beauty. A Nanoleaf is thin like a natural leaf, when outside forces, like the wind pushes the Nanoleaf back and forth, mechanical stresses appear in the petiole, twig and branches. When thousands of Nanoleaves flap back and forth due to wind, millions and millions of Pico watts are generated, the stronger the wind, the more energy is generated. Our Nanoleaves only reflect a small part of the sunlight that strikes them, mostly the green light, and the rest of the spectrum is efficiently converted into electricity. Besides converting the visible spectrum of light, our Nanoleaves also convert the invisible light, known as infrared light or radiation, we can't see it, but we can feel it - it's warm - that's why we call it radiation. Due to the unique combination of photovoltaic and thermo voltaic in our Nanoleaves it converts this thermal radiation into electricity, even hours after the sun has set. The more wind there is, the more Nanoleaves are moved. Wind that is moving thousands of Nanoleaves in a tree canopy are causing mechanical strain in the petiole, twigs and branches. Nano piezo-electric elements incorporated in the petiole twigs and branches are the tiny Nano piezo-electric elements that will generate millions and millions of Pico watts as these thousands of Nanoleaves flap back and forth due to wind. The stronger the wind, the higher the "flap" frequency, and therefore the larger the watts generated in the petiole, twigs and branches.
With the progress in nanotechnology, the photovoltaic, thermo voltaic and piezo electric materials are becoming more efficient

and combined in one system it will give our products more efficiency and we believe that soon, Solar Botanic will be a mainstream green energy provider, more reliable/cheaper and above all better looking International Journal of Advanced Technology & Engineering Research (IJATER)

VI. CONCLUSION

Sun, wind, water, earth and life touch our living senses immediately always, everywhere and without any intervention of reason. They simply are there in their unmatched variety, moving us, our moods, memories, imaginations, intensions and plans. To capitalize on the wealth of designs and processes found in nature, engineering and technology gave us the ingredients, creative thinking, and unique solutions made it possible to bring all this together into natural looking trees.

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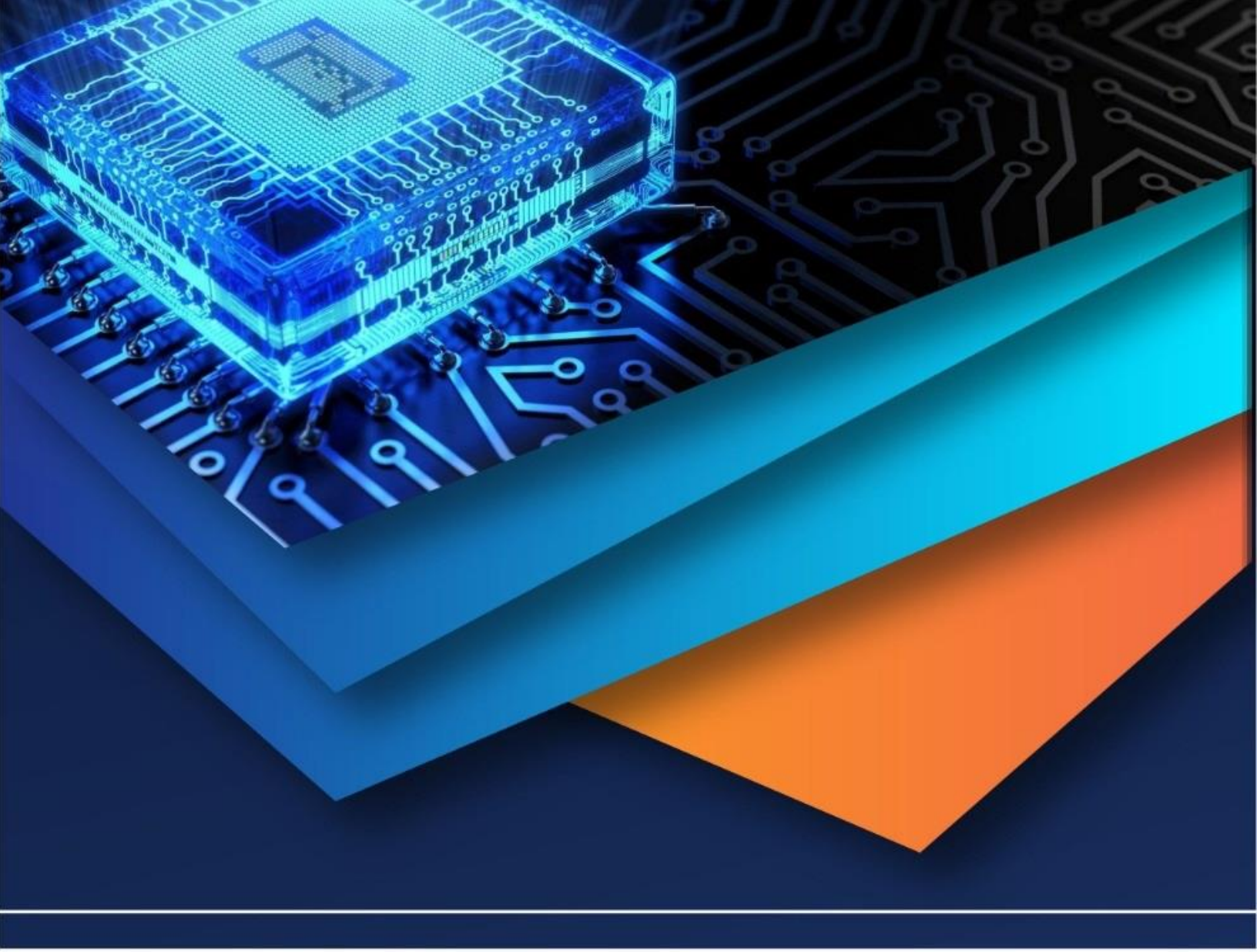

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