Nano Trees - The Latest Renewable Energy Resource

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ABSTRACT

In the years ahead we will witness a world where there will be scarcity for energy resources, but mankind is blessed that we are provided with the solar power which will last for millions of years. And recently with the emerging nanotechnology, scientists are working on the new concept called the nanoleaves that will help producing electricity with the help of solar power which can serve the future demands. AS the near future it is expected to face a huge energy crisis, I would like to put this quote to the world " the most impressive energy system on the earth does not involve fossil fuels, but lies with in every cell of billions of leaves". In this paper I intend to bring to light on how exactly the nanotree can be achieved and what are the future aspect and prospects. Are we witnessing a true revolution in renewable energy sources?!! This is an article on renewable energy, and in particular the innovative technology of artificial trees and leaves known as Biomimicry. We begin with an overview of nanoleaves technology and Biomimicry.

INTRODUCTION

Nanotrees are a cost-effective renewable energy solution that is easily implemented, carbon neutral, aesthetically appealing and community scalable. To accomplish this goal a company named SOLAR BOTANIC has developed an innovative and efficient energy solution by combining Biomimicry and nano technologies in unique, patented, artificial trees.

To harness the power of the sun and wind, these artificial trees and plant

structures are designed to utilize three major types of nano-technologies, the result of which is a commercially viable alternative and/or supplement to other energy generating techniques.

There are many existing opportunities in the adaptation of solar, wind and thermal power. However, like all traditional power generation, none of these are likely to be a single "magic bullet" technology that will solve the entire worlds energy demands.

OVERVIEW OF NANOTREE TECH

One of the emerging nanotechnologies related to renewable energy is nanoleaves and stems of artificially created trees or plants. They are an emerging form of renewable energy through collecting energy from the sun and wind and converting it to electrical energy.The leaves are distributed throughout artificial trees and plants, and when operating at optimum efficiency can supply a whole household with electricity.

They are intended to harness energy provided by the wind and sun, thereafter converting it into electrical energy.

Moreover, to better understand the fundamental of nanoleaves, we have to dig into an innovative field of technologic development, called Biomimicry.

OVERVIEW OF BIOMIMICRY TECH

The nanoleaves have been specially designed to imitate the natural process of photosynthesis. A mechanism by which, typical plants absorb the light emitted by the sun and CO2 in the atmosphere. The artificial trees do even copy the natural re-cycling process of oxygen.

It is very recent that nanoleaves technology started to reap even more advanced levels. It can now harvest thermal energy as well. Moreover, the leaves fixed on artificial trees are also able to collect energy derived through movement of the wind, known as kinetic energy, which is as well converted into electrical energy.

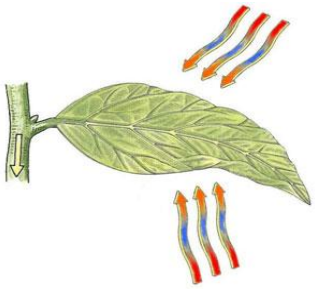
In this Biomimicry theory, the artificial trees are implanted with Nanoleaves, a composite of Nano photovoltaic nanothermovoltaic and Nanopiezo sources transforming light, heat and wind energy into eco friendly electricity. The Nanoleaves transform the whole solar scale converting detectable light, infrared and Ultraviolet in a unification with piezo electric generators that alter wind energy into electricity giving you efficient, cost efficient and attractive looking solutions, whilst providing the greatest electric power.

Biomimicry is a developing science attempting to solve human difficulties by fostering nature's clever systems. This job is accomplished by way of the use of natures design, synthetic trees, shrubs, plants and flowers all armed with nanoleaf engineered PV cells. Biomimicry and Nano technology is intrinsic to SolarBotanic's ethos.

SolarBotanic residential offerings (trees, shrubs, plants etc) will offer up to 50% more energy than traditional solar systems, and in addition will blend in beautifully with your surroundings. SolarBotanic's trees will have the capability of supplying a individual home or can be

placed in regions where natural growing bunches of trees would formerly have been utilized. The solar systems can even be positioned on the ground, roof, or parking structures.

SolarBotanic's renewable energy contains enormous potential as a additional or substitute to fossil fuels for providing energy marketplaces worldwide in addition to developing countries. The company has received approaches from various Government organizations that will supply leading Research and Development resources and attracted investor groups. This emerging yet brilliant method of energy entrapment is both clean and renewable with a broad range of applications.



COMPOSITION & DESIGN OF NANOLEAVES

The nano-technology was initially developed to harness solely solar energy. However, nowadays it has widespread uses. It exploits various alternative sources of energy like wind, solar and thermal energy.

Furthermore, these highly advanced artificial plants and/or trees use tiny cells to capture energy.

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).

Light Energy

There are also tiny photovoltaic cells (PV) incorporated in the nanoleaves. These small PV cells capture the light rays emitted by the sun. The light is then converted into electricity.

Kinetic energy

Kinetic energy is harnessed through movement. The wind produces motion in stems and branches. This motion is collected via piezovoltaic (PZ) cells. The PZ has semi-conducting devices incorporated into the artificial structure of trees and plants. The PZ and the semi-conducting devices convert typical wind energy (kinetic energy) into electricity.

NANO OPERATIONS

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. 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.

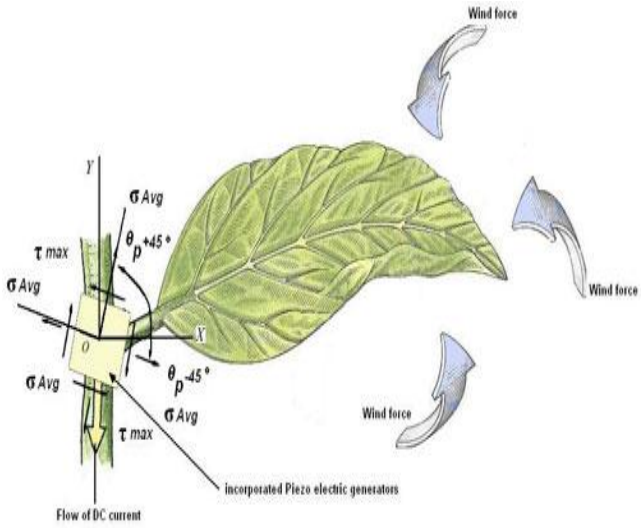
The more wind there is, the more Nanoleaves are moved. Wind that is moving thousands of Nanoleaves in a tree canopy are causing mechanical strain in the petiole, twigs and branches. Nano piezo-electric elements incorporated in the petiole twigs and branches are the tiny Nano piezo-electric elements that 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 nano technology, 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, SolarBotanic will be a mainstream green energy provider, more reliable/cheaper and above all better looking.

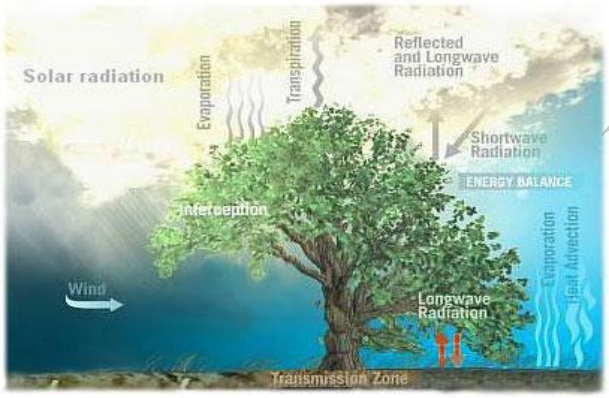
HOW NANO LEAVES CREATES ELECTRICITY

SolarBotanic's Nanoleaves create electricity in three ways:

1. Nanophotovoltaic generators in the leaf directly convert solar energy to electricity.
2. Nanothermoelectric cells convert solar heat to electricity.
3. Nanopiezo generators can also convert wind energy into electricity.



Solar Botanic is a company that plans to introduce "artificial trees that make use of renewable energy for the sun and wind." They have created what they call "nanoleaves" that produce electricity via photovoltaic (light), thermo voltaic (heat), and piezovoltaic (wind) means. Solar Botanic is claiming that a single one of their trees, depending on size and location, can produce between 2,000 and 12,000 kWh per year, plus the trees provide shade and function as a windbreak. Their Nanoleaves, which they say they can produce in a variety of real tree leaf shapes, contain solar cells to convert the sunlight into electricity and thermovoltaic elements to convert thermal radiation into electricity. The nanoleaves are then conected to the twigs and



brances using tiny piezoelectric elements that convert the movements of the leaves caused by wind and rain into more electricity.

According to this post in Green Energy News, the company is working on its first project, a Solar Botanic palm tree that will be "planted" at an undisclosed location in the Middle East. The company says that this one palm tree with 36 power generating fronds will generate more than 5,000 kilowatt hours of electricity in a year. Current plans call for 20 different types (or species) of artificial trees, which will be able to be used in a variety of climates and still look like they belong there.

These solar trees could offer frequent plug-in stations for the electric vehicles and hybrids of the near and distant future. According to SolarBotanic, this trifecta 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.

SolarBotanic Trees would come as broad leaf trees (producing 3500-7000 kWh/year), Evergreen trees (2500-7000 kWh/year) or as shrubs, plants, roof, wall "carpets" and fencing.

SolarBotanic 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?

BEST PLACES TO USE NANOLEAVES

The use of piezo voltaic, thermo voltaic and photovoltaic cells does effectively convert an amalgamation of energy sources into electricity. Artificial energy trees can be used for both domestic and even industrial purposes. According to Solar botanic, erecting an approximate of six meter area of nanoleaves can produce enough energy for an average household.

More, intricate is that, artificial trees can be constructed at various areas, like;

Desert

The earth has large areas of unexploited deserts which can be used to generate a massive amount of electricity, if artificial trees were planted. The energy produced could be used to solve the most predominant challenge in desert; provide electricity to power desalination. The desalinated water could thereafter be used for irrigation and drinking purposes. The fragile desert environment would hardly be affected by such a project yet the benefits are extensive.

To further minimize the environmental impact on desert, the artificial trees could be planted alongside roads, coasts and other areas where it would protect inhabitants from sandstorms and provide constant shade form the sun.

Golf Courses, Recreation Grounds and Parks

Artificial golf courses, recreational grounds and parks could have artificial plants and trees planted to supply electricity for at least a portion of recreational parks. For golf course, the nanoleaves could fuel ground maintenance vehicles.

Office Parking and industrial Zone

The multi-fold benefits of planting trees near office parkings and industrial zone are numerous. It provides with electricity to

office, parking lights and other uses. Moreover, it does also provide with shade from the sun and offers an aesthetic landscaping.

IX. APPLICATIONS OF ELECTRICAL ENERGY FROM NANOLEAVES

The photovoltaic, piezovoltaic and thermovoltaic 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 such as new housing estates, mountainous regions, coastlines, highways, airports, deserts, penthouses, de-forested areas, private gardens etc…

FUTURE SCOPE

Solar Botanic is in discussion with several very large technology firms and expects to implement it worldwide thus offering a piece of energy solution that supplements the energy requirement of future.

Though the primary driver of the trees are the nanoleaves, the trunk can be designed for far greater purposes than merely holding up the canopy. Besides covering it's surface with PV or sound absorption materials, it houses the electric converter units and filters which are designed to intake harmful GHGs and output clean air (just like the real trees do to some extent). Solar Botanic believes that companies that generate a portion of their power from utilizing Solar Botanic trees will be able to create certifiable carbon credits that can be sold on the open market.

CONCLUSION

These super eco friendly synthetic trees will make use of renewable energy from the sun along with wind power, which are an effective clean and environmentally sound medium of gathering solar radiation and wind energy. 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?

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