

Bangalore Mirror 16/11/2016

# MAJOR INNOVATION: FILM INSPIRES SOLAR NANOTECH-POWERED CLOTH

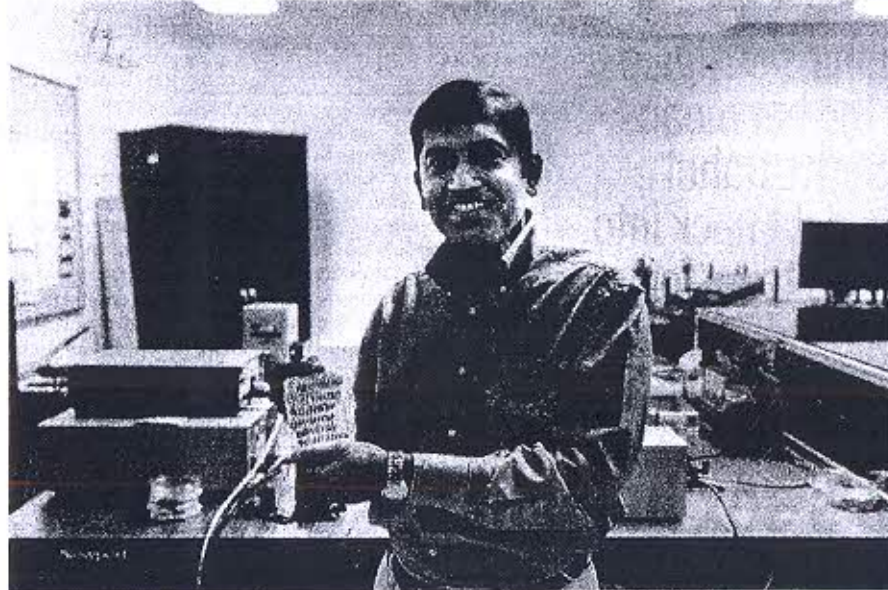
Can revolutionise wearable technology, helping everyone from soldiers who now carry heavy loads of batteries to a texting-addicted teen, who could charge his smartphone by simply slipping it in a pocket

Marty McFly's self-lacing Nikes in *Back to the Future Part II* inspired a UCF scientist, who has developed filaments that harvest and store the sun's energy, and can be woven into textiles.

The breakthrough would essentially turn jackets and other clothing into wearable, solar-powered batteries that never need to be plugged in. It could one day revolutionise wearable technology, helping everyone from soldiers who now carry heavy loads of batteries to a texting-addicted teen who could charge his smartphone by simply slipping it in a pocket.

"That movie was the motivation. If you can develop self-charging clothes or textiles, you can realise those cinematic fantasies, that's the cool thing," associate professor Jayan Thomas, a nanotechnology scientist at the University of Central Florida's NanoScience Technology Centre, said of the film released in 1989. The research was published in the academic journal *Nature Communications*.

Thomas already has been lauded for earlier groundbreaking research. Last year,



Associate professor Jayan Thomas says a major application could be with the military, besides electric cars that could generate and store energy whenever they're in the sun

he received an "R&D 100 Award", which is given to the top inventions of the year worldwide, for his development of a cable that can not only transmit energy like a normal cable but also store energy like a battery. He's also working on semi-transparent solar cells that can be applied

to windows, allowing some light to pass through while also harvesting solar power. His new work builds on that research. "The idea came to me: We make energy-storage devices and we make solar cells in the labs. Why not combine these two devices together?" Thomas said.

Thomas, who holds joint appointments in the College of Optics & Photonics and the Department of Materials Science & Engineering, set out to do just that.

## PROOF-OF-CONCEPT

Taking it further, he envisioned technology that could

**Back to the Future Part II was my motivation. if you can develop self-charging clothes, you can realise cinematic fantasies**

- Researcher Jayan Thomas

enable wearable tech. His research team developed filaments in the form of copper ribbons that are thin, flexible and lightweight. The ribbons have a solar cell on one side and energy-storing layers on the other.

Though more comfortable with advanced nanotechnology, Thomas and his team then bought a small, tabletop loom. After another UCF scientist taught them to use it, they wove the ribbons into a square of yarn.

The proof-of-concept shows that the filaments could be laced throughout jackets or other outdoor wear to harvest and store energy to power phones, personal health sensors and other tech

gadgets. It's an advancement that overcomes the main shortcoming of solar cells: The energy they produce must flow into the power grid or be stored in a battery that limits their portability.

## MAJOR APPLICATIONS

"A major application could be with our military," Thomas said. "When you think about our soldiers in Iraq or Afghanistan, they're walking in the sun. Some of them are carrying more than 30 pounds of batteries on their bodies. It is hard for the military to deliver batteries to these soldiers in this hostile environment. A garment like this can harvest and store energy at the same time if sunlight is available," added Thomas.

There are a host of other potential uses, including electric cars that could generate and store energy whenever they're in the sun.

"That's the future. What we've done is demonstrate that it can be made. It's going to be very useful for the general public and the military and many other applications," Thomas said.

UNIVERSITY OF CENTRAL FLORIDA

I-E Pg No: 5 16-11-2016

# WITH POWER SHORTAGE, STATE LIKELY TO FACE HARSH SUMMER

Consumption set to increase in coming days creating shortage by Feb-end

## Daily power generation

0.08717 MU	Non-conventional
82.536 MU	KPCL
115.953 MU	Others
198.576 MU	Total
198.521 MU	Consumption* (*as on November 14)
+ 50,148 MU	Power purchased since 2009-10
₹24,694 crore	Cost

ASHWINI M SRIPAD @Bengaluru

THE state is likely to witness a power shortage much before the summer sets in. The reason being that power consumption in November is close to the levels seen during summer.

And, in the coming weeks, consumption is likely to increase, resulting in a shortage by the end of February.

The state generates close to 200 million units (MU) of power per day through various stations, including hydro and thermal. A part of it is lost during transmission.

"Demand for up to 210 MU a day can be managed sometimes, but not more than that," said a senior official of Karnataka Power Transmission Corporation Limited (KPTCL).

The state which has spent ₹24,694 crore and purchased 50,148 MU in the last seven years, will end up buying more power in the coming months, the official said.

As on date, 190 Million Units (MU) of power is consumed every day across Karnataka. "During peak hour, it is 9,800 mega watt

(MW)," official. This, according to the official, is close to the power consumption levels during summer. "In summer, on an average 200 MU of power is consumed every day," the official said.

One of the reasons for the increase in power consumption is the lack of rainfall.

"With no water, farmers tend to use pumpsets for irrigation. On the domestic front, use of A/Cs and fans have also increased because of rise in temperature. This situation will persist during summer as well. With a poor monsoon and winter yet to kick in, power consumption has been on the rise. If the trend continues over the next few months, we might have power cuts in February. We need to utilise power in a more disciplined manner for which public has to cooperate," the official said.

Kumar Naik, Managing Director, Karnataka Power Corporation Limited (KPCL), said they have stored sufficient water for power generation. "Things are better compared to previous year," he said.

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# Soon, jackets that charge phones

## Thin Filament Stores Sun's Energy & Can Be Woven Into Fabric

**Washington:** Led by an Indian-origin scientist, a team in the US has developed filaments that harvest and store the sun's energy, and can be woven into textiles that can power phones, personal health sensors and other gadgets.

The breakthrough would essentially turn pieces of clothing like jackets into wearable, solar-powered batteries that never need to be plugged in, the researchers said. It could one day revolutionise wearable technology, helping everyone, from soldiers who carry heavy loads of batteries to texting-addicted teens, who could charge their smartphones by simply slipping them into their pockets, they said.

"The idea came to me: We make energy-storage devices and



ALL CHARGED UP

we make solar cells in the labs. Why not combine these two devices together?" said Jayan Thomas, an associate professor at University of Central Florida.

Inspired by the 1989 movie 'Back to the Future Part II', the research team developed filaments

in the form of copper ribbons that are thin, flexible and lightweight. The ribbons have a solar cell on one side and energy-storing layers on the other. "If you can develop self-charging clothes or textiles, you can realise those cinematic fantasies—that is the cool thing," Thomas said.

Thomas and his team subsequently bought a small, tabletop loom, and wove the ribbons into a square of yarn. The proof-of-concept shows that the filaments could be laced throughout jackets or other clothing items to harvest and store energy to power phones and other gadgets.

It is an advancement that overcomes the main shortcoming of solar cells: the energy they produce must flow into the power

grid or be stored in a battery that limits their portability.

"It is hard for the military to deliver batteries to soldiers in hostile environments. A garment like this can harvest and store energy at the same time if sunlight is available," Thomas said.

There are a host of other potential uses, including electric cars that could generate and store energy whenever they are in the sun. "That is the future. What we have done is demonstrate that it can be made," Thomas added.

"It is going to be very useful for the general public and the military and many other applications," he said.

The study was published in the journal 'Nature Communications'. #

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## Battery cars better than fuel cell vehicles to cut emissions'

**BOSTON, PTI:** Electric battery cars are a better choice for reducing carbon dioxide emissions than vehicles that run on hydrogen fuel cells in terms of overall costs, according to a new study.

Cars with hydrogen infrastructure provide few additional energy benefits besides clean transportation, according to researchers from Stanford University in the US and the Technical University of Munich (TUM) in Germany.

They compared cars that run on batteries versus hydrogen fuel cells in a hypothetical future where the cost of electric vehicles is more affordable.

"We looked at how large-scale adoption of electric vehicles would affect total energy use in a community, for buildings as well as transportation," said lead author Markus Felgenhauer, from TUM.

"We found that investing in all-electric battery vehicles is a more economical choice for re-

ducing carbon dioxide emissions, primarily due to their lower cost and significantly higher energy efficiency," said Felgenhauer.

Electric vehicles come in two flavours: plug-in cars with rechargeable batteries, and fuel cell vehicles that convert hydrogen gas into clean electricity.

Unlike gasoline-powered cars, battery and fuel cell vehicles emit zero carbon when driven. But deploying them at scale will require a costly new infrastructure for charging batteries or delivering hydrogen fuel. The researchers focused on California, a leader in electric vehicle transportation. Statewide, battery electric cars are growing in popularity.

"In terms of overall costs, we found that battery electric vehicles are better than fuel cell vehicles for reducing emissions," Felgenhauer said.

The study appears in the journal *Energy*.

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## Clothes that harvest solar energy developed

**WASHINGTON, PTI:** A team led by an Indian-origin scientist in the US has developed filaments that harvest and store the sun's energy and can be woven into textiles which can power phones, personal health sensors and other gadgets.

The breakthrough would essentially turn jackets and other clothing into wearable, solar-powered batteries that never need to be plugged in, researchers said.

It could one day revolutionise wearable technology, helping everyone from soldiers who now carry heavy loads of batteries to a texting-addicted teen who could charge his smartphone by simply slipping it in a pocket, they said. "The idea came to me: We make energy-storage devices and we make solar cells in the labs. Why not combine these two devices together?" said Jayan Thomas, associate professor at University of Central Florida in the US.

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## Electric battery cars more feasible to cut emissions'

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## A Green Way to Fund Solar and Wind Projects

11/11/16



**MUMBAI** With the government targeting 160 GW of solar and wind capacities by 2022, green bonds can be a potential option to support the funding needs, according to a report released by ASSOCHAM and CRISIL. Green bond is used to raise funds that are used only for financing 'green projects'.