Career Option in Sustainable Habitats
Opportunities Unlimited !!!!

B.S.Satyanarayana
R V College of Engineering. Bangalore

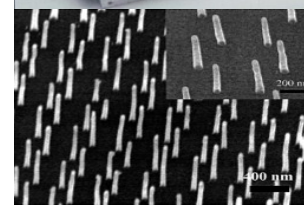
Outline

RVCE Vision

What do we mean by Career Opportunities in Sustainable Habitats

What are we doing to Prepare our students

Conclusion



VISION

LEADERSHIP IN QUALITY TECHNICAL EDUCATION, RESEARCH & INNOVATION THROUGH TEAMWORK, WITH A FOCUS SUSTAINABLE AND INCLUSIVE TECHNOLOGY

Part of our **Mission**

(Initiative in this Golden Jubilee year 2013-14 to be completed in a Max 3 years)

(i) Zero Water (Discharge and Intake self sustained)
(ii) Zero Waste
(iii) Zero Energy Campus by 2016

Engineering Grand Challenges


Make Solar Energy Economical


Provide Energy From Fusion


Develop Carbon Sequestration Methods


Manage the Nitrogen Cycle


Provide Access to Clean Water


Restore and Improve Urban Infrastructure


Advance Healthcare Informatics


Engineer Better Medicines


Reverse Engineer the Brain


Prevent Nuclear Terror


Secure Cyberspace


Enhance Virtual Reality


Advance Personalized Learning


Engineer the Tools of Scientific Discovery

NATIONAL ACADEMY OF ENGINEERING
OF THE NATIONAL ACADEMIES

National Science Foundation
WHERE DISCOVERIES BEGIN

What do we mean by Career Opportunities in Sustainable Habitats ?

Career Options

- Design and Construction
- Consultants, Policy makers, Advocacy and Change leaders,
- Architect (Environmental /Sustainable Design)
- Agricultural Inspector
- Building Operations Management
- Camp Counselor
- Career Consultants (Green)
- Clean energy (solar, wind, biomass, biofuels, geothermal, waste to energy, hybrid systems, energy harvesting and scavenging)
- Scientists working on Chemical, structural. Biologist(Conservation), Material, sensors, Environmental, Hydrologist, Climatologist, Environmental Meteorologist, Toxicologist
- Energy Efficient systems (integrated infrastructure and health monitoring, electrical, light wind and air harvesting)
- Climate Risk Analyst, Emissions Manager, Emissions Trader

Community Affairs Manager

Complementary Health and Medical Care

- Heating, air conditioning and refrigeration engineers, mechanic to technicians/installer

- **Construction (Energy Efficiency – Green Building)**
- **Corporate Social Responsibility Professional**
- **Ecologist**
- **Economists (Environmental & sustainable Issues)**
- **Educators (Ecological and all aspects of Sustainability)**
- **Energy Manager (Renewable)**
- **Engineers (Environmental / Pollution Control, Sustainable Energy)**

Entrepreneur (Green)

Environmental Health and Safety (EHS) Technicians

- **Financial analyst/adviser specializing in socially responsible investing**

Food Scientist, Organic Food and Farming

Production Specialists

Forester

Furniture Builder (Eco-friendly)

- **Industrial Designer (Sustainable)**

Interface & Interior Designer (Green)

IT Specialists (Green Software and Hardware Developers)

Lawyer (Environmental)

Advocacy Agencies

Sustainability Specialists

- **Waste Management**

Construction Professionals

The 12 Principles Sustainable Technology (especially for materials)

- Pollution Prevention
- Atom Economy or saving on materials
- Less Hazardous Synthesis
- Design Safer Chemicals
- Safer Solvents & Auxiliaries
- Energy Efficiency
- Renewable Feed stocks
- Reduce Derivatives
- Catalysis
- Design for Degradation
- Real-Time Analysis
- Accident Prevention

Interdisciplinary Research Groups

- ***Materials & Manufacturing Engineering*** *with additional capability for Design of Structures, Zigs & Fixtures, Process Equipments, Process Monitoring tools, Design for Optimization of Manufacturing processes, Casting & forging, Rapid Prototyping, Production & Supply Chain Mgmt, Testing for biofuels & blends.*
- *The broad areas of* ***Materials*** *include* ***polymers, composites****, wide range of* ***nano materials*** *(metals, ceramics and semiconductors) and* ***amorphous materials*** *for applications in* ***transport(aviation, automobile to agriculture), construction, health, communication, clean energy and electronics****.*
- ***Sensors, Networks and Communication(upto THz)***
- ***Nano Science, Surface Engineering & MEMS***
- ***Data Mining/ Data warehousing or Business Intelligence****, Cloud Computing,*
- ***Environment Friendly*** *And* ***Sustainable*** *Technologies with* ***Enable*** *Intelligent* ***Infrastructure Management buildings (Health Monitoring), Smart Cities*** *including and* ***Intelligent Transport Systems****.*
- ***Clean & Renewable Energy, Energy Efficiency & Management***
- ***Large Area and Plastic / Printable (Flexible) Microelectronics***
- ***Advanced Instrumentation including Medical Instrumentation***
- ***Highways and Transport technology***
- ***Clean Water and Waste Management***

100 KW Bio Mass Gasifier Based Power Generation Plant

Sustainable Clean Energy From Waste

Biofuel Generation & Waste Lignite & Coal to Clean Fuel

Plastic Waste to Fuel including thermoset plastics and using an Industrial waste as catalyst)

Raw feed stock

Product oil of thermal cracking

Cultivation of Algae in waste water

Rain Water Harvesting & Sewage Treatment Plant

(Expect to reach Zero discharge in 3) years

Harvesting close to & Seven million liters covering 55% of the Campus. Hope to harvest 100% in two years time.

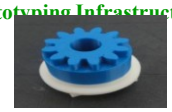
An STP Plant with 2.5 Lakhs liter Capacity Installed and can be scaled to 5 Lakh liters. & 1000 L experimental STP plant

50 Liters ETP plant installed

Indigenous Process Equipment for Processing Nanomaterials, Polymers, Composites and Plastics



Rapid Prototyping Infrastructure

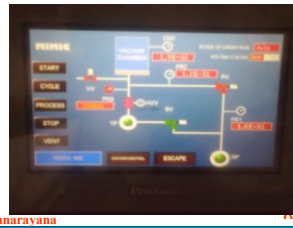




Components made by using Rapid Prototyping Facility

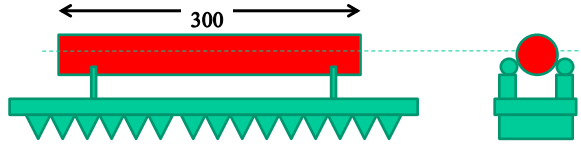
Cluster Deposition (Plasma CVD) system & a DC Plasma CVD system



Solar Metallization Unit



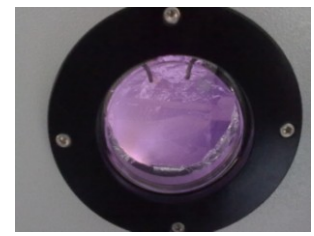
CUSTOM DESIGNED DC MAGNETRON SPUTTERING & PECVD COATING SYSTEM FOR SOLAR RECEIVER TUBES



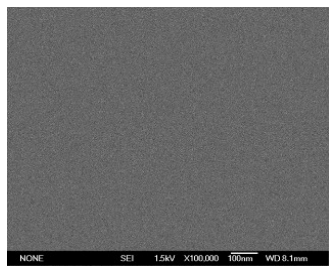
Τυβε Διαμετερ
50 μμ

Electron beam & Thermal deposition Unit

Plasma Ion Bombardment

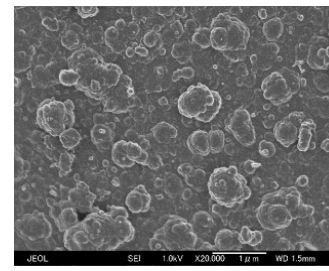


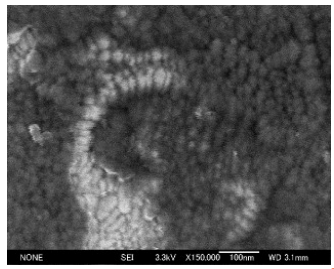
Nano Carbon films Grown at near Room Temperature



Atomic Smooth films

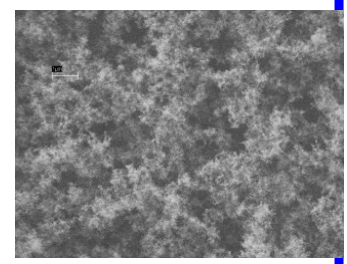
Nanocluster Carbon



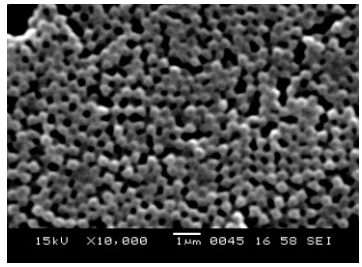


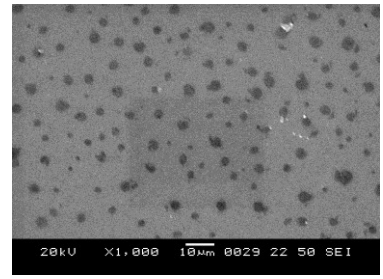
Nano Pillars

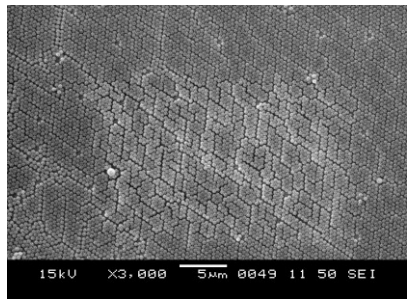
Nano Fibers /Nanohorns

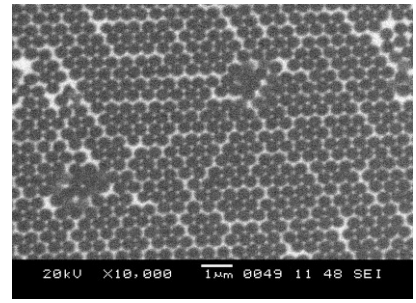


Nanosphere Lithography









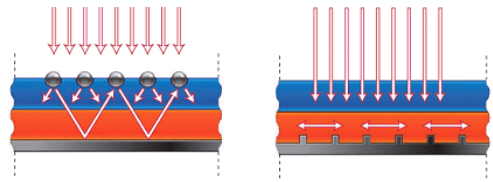
HHV Capabilities

Large Area MgO coating Unit for Samtel 1 m x 1 m PECVD for a-Si solar modules

Large Area Telescopic Mirror Coating Unit

Dual Plasma Coater for Solar Thermal coatings Multi-Axis Robotic Coater for Canopy

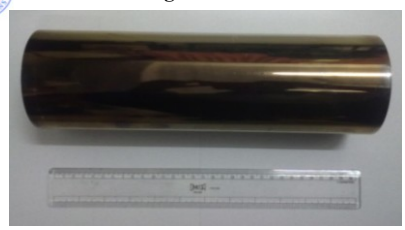
Device concept - Nano patterned metal at the Front and Back Contact

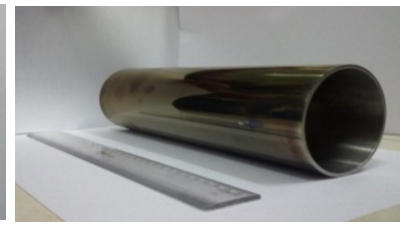


Current efficiency in cell level is 8 -9% and module efficiency is ~7 %

Expected increase in efficiency is by 20-30%.

300mm length of SS 304 Tube with a Wall Thickness of 1.6mm



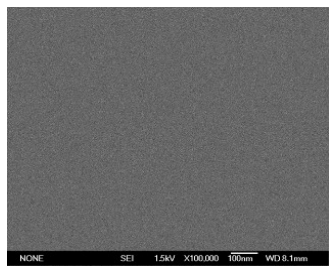


Assembled Tube = 1000 mm long with glass outer tube (ID70mm / OD75mm)

Ινσταλλεδ Χαπαχιτψ οφ Σολαρ Τηερμαλ Σψστεμσ
ατ Ρ.ς.Χολλεγε οφ Ενγινεερινγ
24,000 λτσ οφ ηοτωατερ περ δαψ

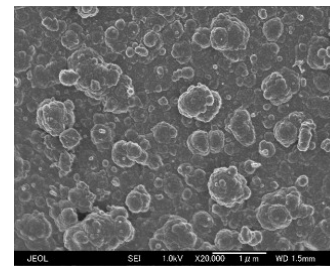
Σολαρ Πς Σψστεμσ 12 κΩ
280Ω ξ 36 πανελσ
130 Ω ξ 10 πανελσ
Ωιλλ βε ινσταλλεδ το ποωερ τηε Χομπυτερ Λαβ.

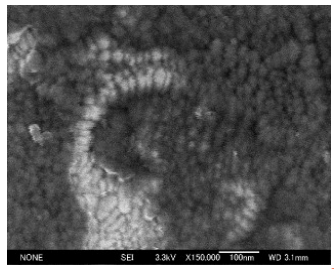
Nano Carbon films Grown at near Room Temperature



Atomic Smooth films

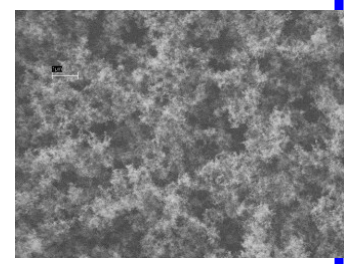
Nanocluster Carbon





Nano Pillars

Nano Fibers /Nanohorns

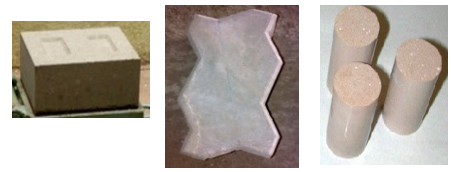


Novel Environment Friendly Construction Material

- Different **cementicious composites** -using Industrial waste/Marginal
- Fly ash, GGBFS, Lime, Gypsum, Quarry dust, Pond ash etc.
- Potential to use as **alternatives to OPC**
- Using in construction **= the best way to dispose**

Blocks with different shape and size

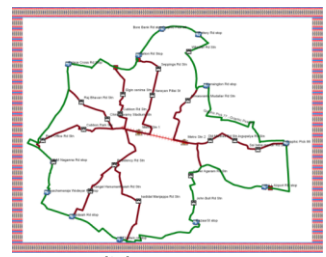
PB1 PB2 PB3



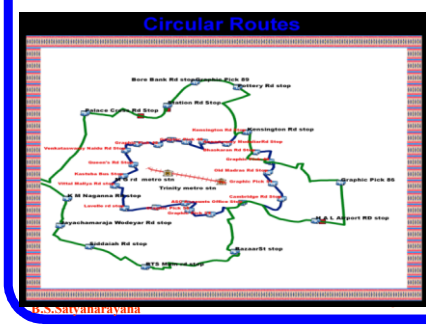
CB1 CB2 CB3

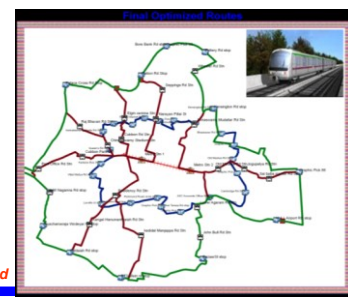
Application Of GIS & RS For Wide Range Of Activities Including Environment Monitoring, Water Harvesting, To Sustainable City And Town Planning

Students at the RVCE – ISRO supported GIS/RS facility in the Civil Engineering department used the satellite data to develop a detailed and optimized feeder bus route for the upcoming METRO project for Bangalore.
Similarly the GIS data has been used for water resources management in the coastal regions of Dakshina Karnataka and for development of reservoirs (water bodies) in and around Bangalore. Further lot of image processing satellite data has been carried out for wide range of environment & resource analysis purposes.

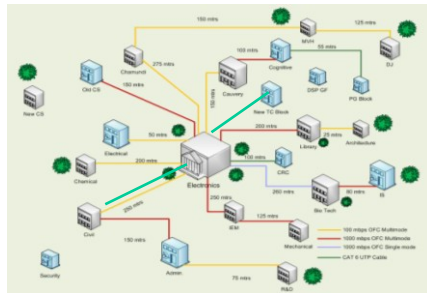


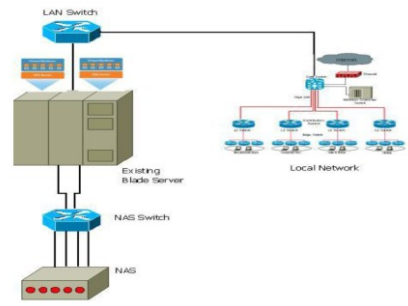
Radial Routes

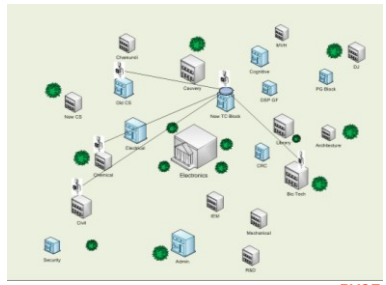




Currently Established Campus Network Backbone, Wireless AP Connectivity (redundancy) and Server Virtualization being







- Expenditure to date towards the network, systems and software ~ Rs 2.2 Crores in the last 3 years.
- This includes ~25Kms of Fiber + Cat 6 cables, 93 AP (scalable to 200), Over 30 servers including 3 Blade Servers and other PC based servers, spread over 20 locations in the campus.
- A cloud environment would not just add to hands on educational opportunity to students and faculty, but help optimize resources, effective utilization of licenses and more opportunity for interdisciplinary usage.

Conclusion

Presented Is A Brief Overview Of Career Opportunities And How Even One Initiative With Sustainability And Inclusiveness Can Go A Long Way

Only Thing That Can Limit Us Is Our Imagination Other Wise It Is Opportunities Unlimited


Thank You