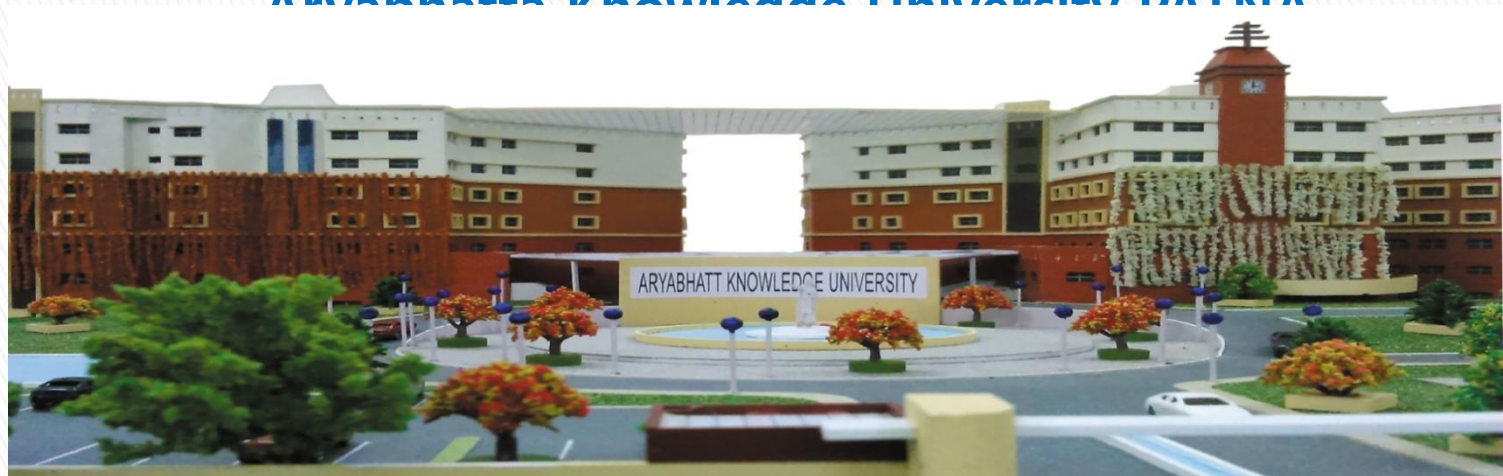


Understanding Natural Laws and Inspire for Innovations and Sustainable Solutions

Dr. Rakesh Kumar Singh

Ph. D. , Post-Doc.

**University Centre for Nanoscience & Nanotechnology
School of Engineering and Technology
Aryabhata Knowledge University, PATNA**



**Senior Resource Person of Utsahi Physics Teachers,/ Anveshika
Coordinator, Coordinated by Prof. H.C.Verma, IIT Kanpur**

Asst. Prof. of Physics, Patna Women's College, Patna Univ (Aug.04-13)

Acknowledgement (Research Group/ Mentors/ Academic linkage)



Prof. H.C Verma
IIT Kanpur



Padmashri Prof. K.L Chopra
Ex. Director IIT Kharagpur



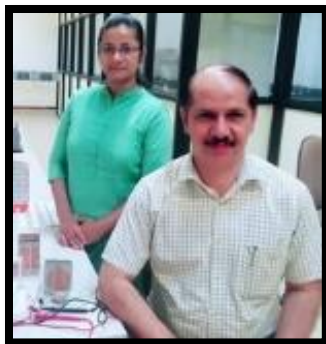
Prof. Avinsh C Pandey
V.C of Jhansi University



Prof. Ashok K. Ghosh
Research Head MCRI, Patna



Dr. Amarendra Narayan
Patna University Patna



Prof. R.K Kotnala
NPL New Delhi



Dr. Chandan Upadhyay
IIT BHU



Dr. Manoranjan Kar
IIT Patna



Prof. A. YadaV
Former Vice
Chancellor



, Prof. Dolly Sinha, Pro. V.C,
P.U



Prof. S.P.Verma
President, SFS, Bihar



Prof. R. K. Verma
Vice Chancellor, Munger Univ



Dr. Sr.Doris D' Souza
Principal, Patna Woemen's College

Ph.D Scholar- Awarded/Thesis Submitted/ Working

1. Abhay K Aman, M.Tech- G.B.Univ, Delhi
2. Archana Kumari, M.Sc- Central University of Bihar
3. H.SatyaPal, M.Tech- B.I.T- Meshra
4. Sanjay Kumar, M.Sc- Patna University
5. Sweta Kumar, M.Sc, Faculty- Gaya College Gaya
6. Dr. P.K.Dwedi, Associate Prof., Govt. Ayurveda College, Patna
7. B.Bitramiditya, Global Chairman, Tekbrian, South Korea
8. Md. Tanvir, M.Sc, IIT Madras
9. Ms. Pushpa Sharma, M.Sc, Central University of Bihar

M.Tech(PG level Research Project – Supervision)

Total no. of Research Project Guided-21

Total no. of Research Project continue-10

UG level Research Project Guided- 17 ,

under College with potential for excellence scheme of UGC, Basic Scientific Research, UGC special scheme and NAAC-A grade with CGPA 3.58/4- Research scheme at Patna Women's College, Patna University

Profession and Global Recognition

√

Engineering Science/ Basic Science/ Medical Science

Converging Science & Technology

'Science is a global business'

Interview with Senator Kim Carr, Australian Minister for Innovation, Industry, Science and Research.

After assuming office in 2007, the Labour Government in Australia instituted a separate Ministry for fostering innovation, for the first time in the country's history. Two years later, the government published a White Paper, titled "Powering Ideas," which reflected the understanding that research policy needs to incorporate a substantial role for international collaboration.

In this interview, done in Bangalore with V. Sridhar, Senator for Victoria Kim Carr, a former school teacher for 10 years and now Minister for Innovation, Industry, Science and Research, outlines the challenges facing Australia, which have influenced the government's priorities for scientific research. Excerpts:

You have followed science, innovation and research affairs during the last decade, first as a shadow Minister and later as Minister in the Labour Government. What are the key elements of Australia's strategy of fostering innovation?

My portfolio brings together university research, science and business innovation for the first time in Australian history. It is aimed at building on our strengths. We understand that we are working in an international context. What we do in the economy is linked to what we do as a society.

The key issue is about improving the living standards of our people. But we are also trying, through international cooperation, to assist other people to build their standards of living. Also, the social agenda is as important as the economic agenda.

How has the ordering of your priorities been shaped by your understanding of the areas in which Australia is strong, and of areas in which you need to develop partnerships with other countries?

We want to collaborate in all areas. We do not discriminate between areas of research. We will encourage our best and brightest to work with the best and brightest in other countries. The big problems facing humanity — climate change, the problem of ageing [populations], the global problem of food or water security — are such that no one country can ever hope to solve [them] by



KIM CARR: "With Indian scientists and institutions we are talking about nanotechnology, biotechnology, water conservation, and astronomy." — PHOTO: K. MURALI KUMAR

Our fundamental premise is that you need constant improvement if you want to maintain the quality of life at a certain level. No society can survive on the presumption that the status quo is good enough. Only societies that are capable of profoundly questioning themselves will be able to build better living standards. The key to innovation is problem-solving, identifying ways of improving

indigenous communities, we need to do a lot more. Despite our weaknesses, we have done well in supporting people through change.

The structure of the Australian economy has changed dramatically in the last 30 years; it is going to change a lot more in the next 30 years. We have to provide support to enable people to move to new jobs. We need to ensure that people are

the answers — not even by the U.S., the most powerful country of the world. The scientific method is predicated not on the individual, but on teamwork and the sharing of knowledge, despite all the fantasies of Hollywood.

Australia produces three per cent of the scientific papers published worldwide. Our scientific contributions may be disproportionately large when compared to our share of the global population, but that is not good enough.

With Indian scientists and institutions we are talking about nanotechnology, biotechnology, water conservation and astronomy — we have a broad engagement. The Australia-India Strategic Research Fund, which started in 2007, has a contribution of A\$65 million from our side, with an equal amount committed by the Indian counterpart, the Department of Science and Technology. We have spent A\$31 million so far on 9 projects in India and Australia.

You have an MoU with the Indian Space Research Organisation (ISRO), which is due for renewal. What have been the achievements of this collaboration?

Neither country at this time has the capacity to launch a manned space vehicle. It is more about collaboration on spatial technologies. In particular, it is about having a better understanding of earth observation systems, especially in relation to climate change. It also includes other areas, such as understanding the oceans, issues relating to geology and monitoring natural disasters. We are also working with NASA, and the European and Japanese space agencies along similar lines.

Our collaboration with ISRO complements these other engagements. The beauty of it is that we have much to contribute because of our geographic location.

What has been the progress in the Square Kilometre Array (SKA) project? What is India's contribution?

The decision on the siting of the project — whether it will be in Australia, New Zealand or southern Africa — will be taken next February. We welcome India's entry with an observer's status on the governing board of the project. Two Indian institutions — the Raman Research Institute [in Bangalore] and the National Centre for Radio Astronomy

Venkatraman Ramakrishnan ?



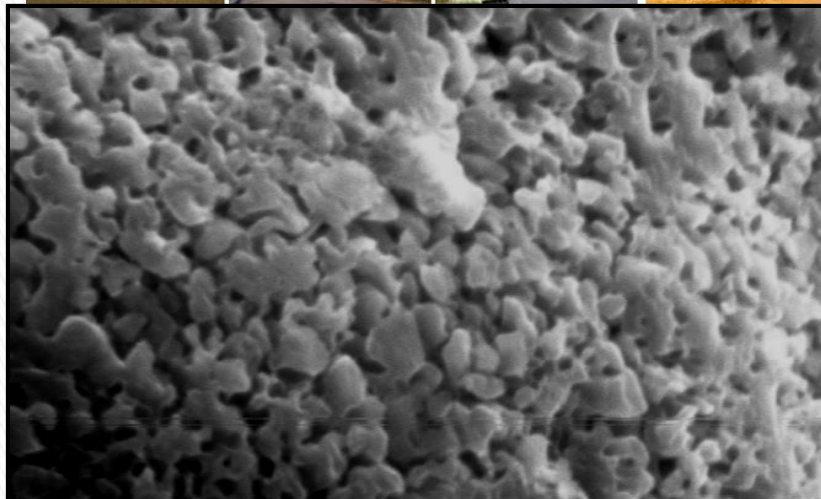
World of Interdisciplinary Science & Engineering

Venkatraman "Venki" Ramakrishnan is an Indian born– American –British Structural **Biologist** . In 2009 he shared the Nobel prize in **Chemistry** with two other scientist "for studies of the structure and function of the Ribosome . Graduating with a Bachelor of Science degree in **Physics** and also M.S in Physics.

Nano Silica (Engineering Materials) production from Rice Husk and Drug Delivery



- Nanosilica from Rice husk for different applications in rubber industry, cement, Biomedical science etc.

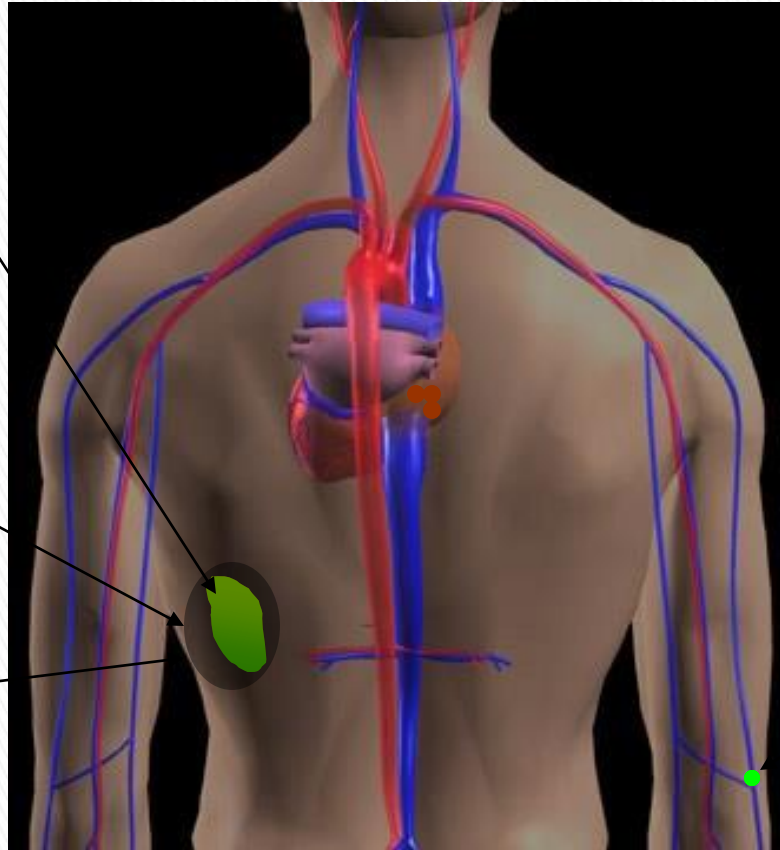


Nanoparticles in Guided Drug Delivery

Solid tumor

Apply magnetic field to concentrate particles

Modulate field to release drug from particles



Other options for targeting:

1 - Direct injection into tumor site

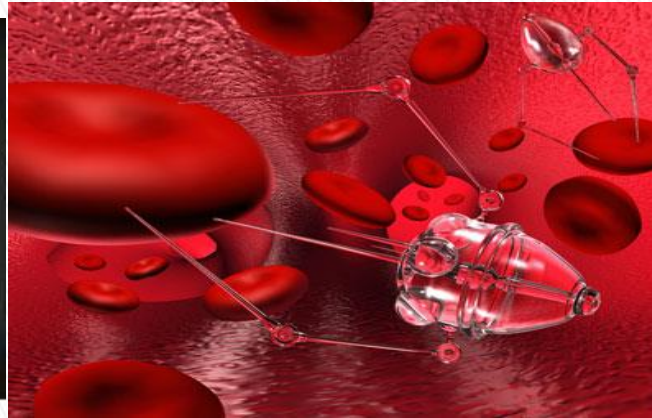
2 - Coating NMP with antibodies to target tumor

Inject NMPs IV,
NMP will circulate
through the blood stream

Engineering/Technical Education/ Applied Physics and Converging Technologies and 21st century

Nanotechnology,

- Bioinformatics,
- Cognitive and neuroscience,
- Information and communication technology,
- Molecular medicine



- Medical Industry/Hospitals hires Physicist/Engineers to improve medical technology through research that further develops the use of radiation, ultrasound, imaging such as MRI

There is plenty of room at the bottom



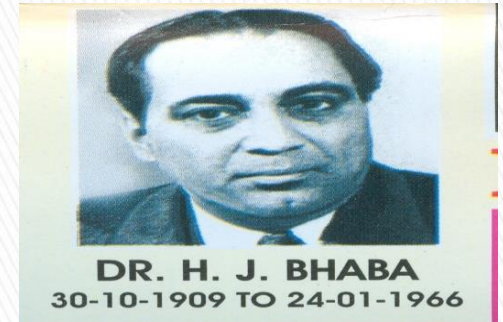
Sir Jagadish Chandra Bose was a, physicist, Biologist, Biophysicist, Botanist and Archaeologist, and an early writer of science fiction.

J C Bose

(1887–1937)

He showed that plant tissues were as alive as animal tissues, and could respond to changes in their environments.

Atomic Energy and Engineering Science



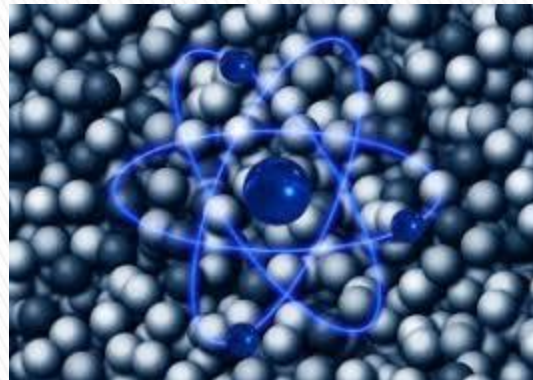
Dr. H.J.Bhabha

Founder of India's Atomic Energy Programme
Love for Innovation and Recognition with Wealth

I seriously say(Father)to you that business or job as an engineer is not thing for me, it is totally foreign to my nature and radically opposed to my temperament and opinions. Physics is my life, I know I shall do great things here. Therefore, when Bhabha passed the mechanical Tripos at Cambridge with first class, his father allowed his son to fulfill his wishes. Bhabha joined the cavendish laboratory, from where he obtained his Ph.D. in theoretical Physics and many sensational discoveries were made.

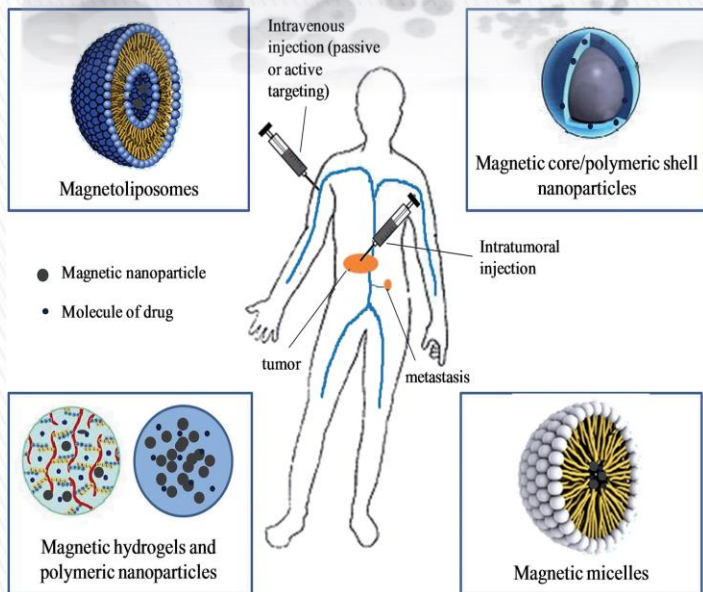
Multidisciplinary Innovations

The Bhabha Atomic Research Centre is India's premier is a multi-disciplinary research centre with extensive infrastructure for advanced research and development covering the entire spectrum of nuclear science, engineering and related areas.



Nano Ferrites : Engineering Materials

Electronics and Electrical Materials and Converging Technology

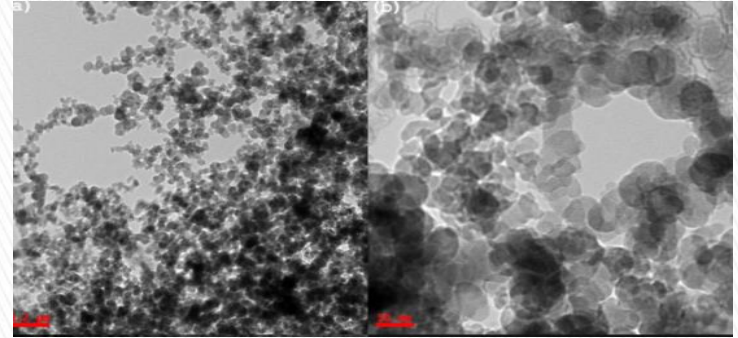
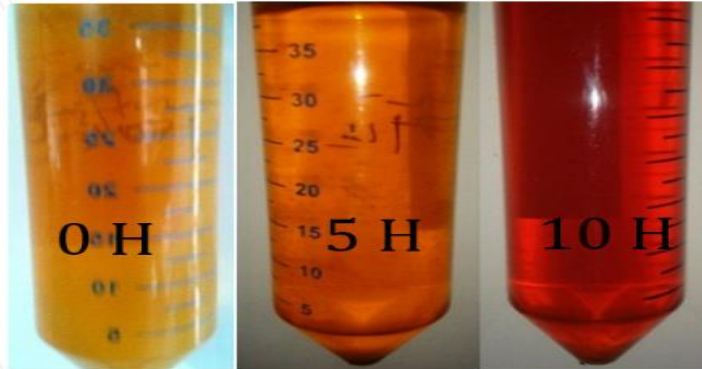




layer on Kitchen Pot by using detergent and Human health and Removing impurity layers is under category of Surface Engineering



Turmeric Powder and Bio availability in various disease treatment



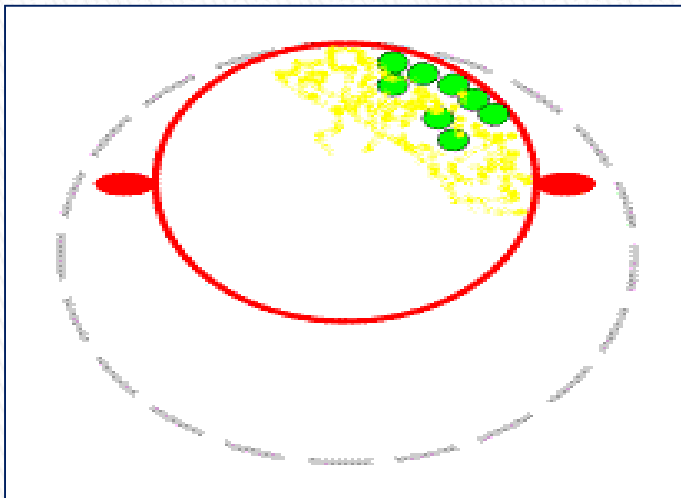
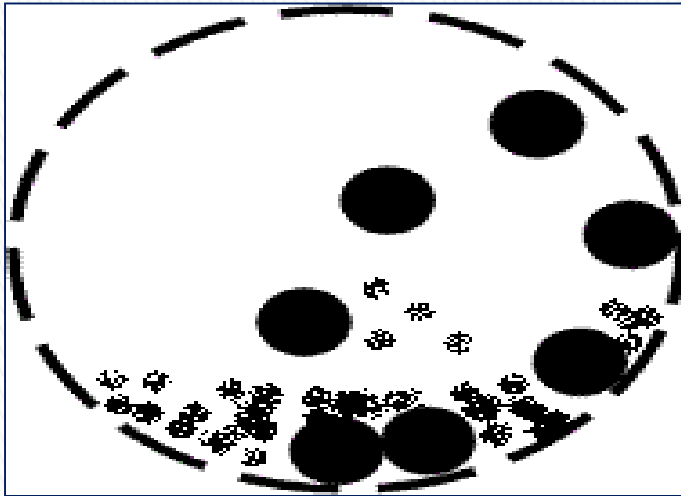
Colour Changes due to size reduction at nanoscale in Haldi powder and Particle size distribution of nano haldi powder as observed by Electron Microscope.

• **Potential Applications**

Such Nanometric food particles of turmeric can improve the physicochemical properties of food materials. This materials also possess luminescence may be useful in biomedical applications, pharmaceutical industry, flavouring & colouring agent & potential for drug delivery system.

METHODOLOGY USED for Food as a new functional Material

May be thrust area of Research in Science for health sector



आर्यभट्ट ज्ञान विवि के नैनो विज्ञान एवं नैनो प्रौद्योगिकी केंद्र में तीन वर्षों से चल रहा था शोध

करेला का नैनो पाउडर रोकेगा कैंसर का ग्रोथ

हिन्दुस्तान

खास

पटना | शशिभूषण

आर्यभट्ट ज्ञान विवि (एफेयू) के नैनो विज्ञान एवं नैनो प्रौद्योगिकी केंद्र ने करेले का नैनो पाउडर बनाने में सफलता हासिल की है। शोधकर्ताओं का दावा है कि यह पाउडर कैंसर की कोशिका को बढ़ने (ग्रोथ) से रोकता है। केंद्र के अध्यक्ष डॉ. राकेश कुमार सिंह और शोधार्थी अभय कुमार अमन

ने बताया कि शोध के दौरान कैंसर की कोशिका पर रिएक्शन का प्रयोग पीजीआई (लखनऊ) में किया गया, जहां उत्साहजनक परिणाम मिला। शोध में यह बात साबित हुई कि यह कैंसर में उपयोगी हो सकता है। इसके अलावा मधुमेह सहित अन्य बीमारियों में भी इसका उपयोग किया जा सकता है। यह हर्बल फॉर्मस्यूटिकल और कृषि के क्षेत्र में संभावनाओं का नया द्वार खोल देगा। बिहार जैसे कृषि आधारित प्रदेश को फायदा हो सकता है। नैनो पाउडर बनाने के बाद करेला पाउडर का स्ट्रक्चर सामान्य करेला के पाउडर से बिल्कुल भिन्न मिला है।

दावा

- मधुमेह और अन्य बीमारियों में भी फायदेमंद हो सकता है करेला का पाउडर
- हर्बल फॉर्मस्यूटिकल और कृषि के क्षेत्र को बिहार में मिल सकता है बढ़ावा



इसका केमिकल कंपाउंड भी बदल गया। यही नहीं, नैनो पाउडर का जैसे जैसे साइज छोटा किया गया, उसकी चुंबकीय शक्ति बढ़ती गई, जबकि सामान्य करेले के पाउडर में चुंबकीय गुण बिल्कुल नहीं था। ऐसे में विभिन्न

बीमारियों में यह ज्यादा कारगर होगा। चुंबकीय गुण की वजह से शरीर इस पाउडर को तुरंत अवशोषित कर लेगा। नैनो पाउडर 28 से 31 नैनोमीटर तक बनाया गया। 28 नैनोमीटर वाले पाउडर में अधिक क्षमता मिली।

6 अत्याधुनिक मशीनों का लिया गया सहारा

अभय कुमार अमन इस विषय पर पिछले तीन वर्षों से विभागाध्यक्ष डॉ. राकेश कुमार सिंह के गइडेंस में पीएचडी कर रहे हैं, जिसमें उन्हें यहां गेस्ट फेकल्टी भूमि दी गई। डॉ. राकेश ने बताया कि इस शोध के लिए सेंटर को लैब में रखी छह अत्याधुनिक मशीनों का सहारा लिया गया, जिसमें नैनो पाउडर बनाने के लिए हार्ड एनर्जी बॉल मिलिंग मशीन, बदला हुआ स्ट्रक्चर एनालिसिस के लिए स्कैनिंग इलेक्ट्रॉन माइक्रोस्कोप, केमिकल नेचर ब्यांड देखने के लिए फ्लूरिडर

ट्रांसफॉर्म इंफ्रारेड, चुंबकीय गुण जांचने के लिए वाइब्रेटिंग सेंपल मैग्नेटोमीटर, इलेक्ट्रॉनिक स्ट्रक्चर के लिए ल्यूमिनेसेंस और नैनो पाउडर के कोर-शेल इंटरैक्शन के लिए एक्स-रे डिफ्रैक्टोमीटर का उपयोग किया गया। नैनो पाउडर बनाने और इसके नए गुणों के बारे में लिखा आलेख 'इंटरनेशनल जर्नल ऑफ रिसर्च' के अगस्त अंक में छपा है। डॉ. राकेश ने बताया कि कैंसर सेल पर रिएक्शन का प्रयोग हाल में हुआ है। इसके लिए अलग शोध पत्र प्रकाशित होगा।

6 यह वैसिक शोध है, जो आगे के शोध के लिए महत्वपूर्ण होगा। इस शोध में विश्वविद्यालय और बिहार सरकार का अहम सहयोग रहा है।

- डॉ. राकेश कुमार सिंह, विभागाध्यक्ष, नैनो विज्ञान एवं नैनो प्रौद्योगिकी केंद्र

Ayurvedic Bhasama as Nanomedicine – An ancient Indian Glorious Past

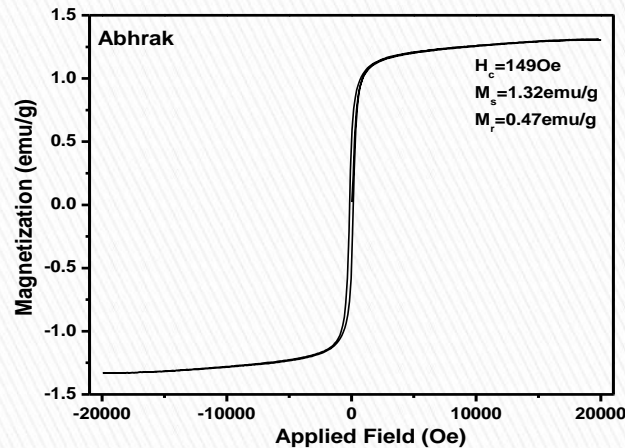
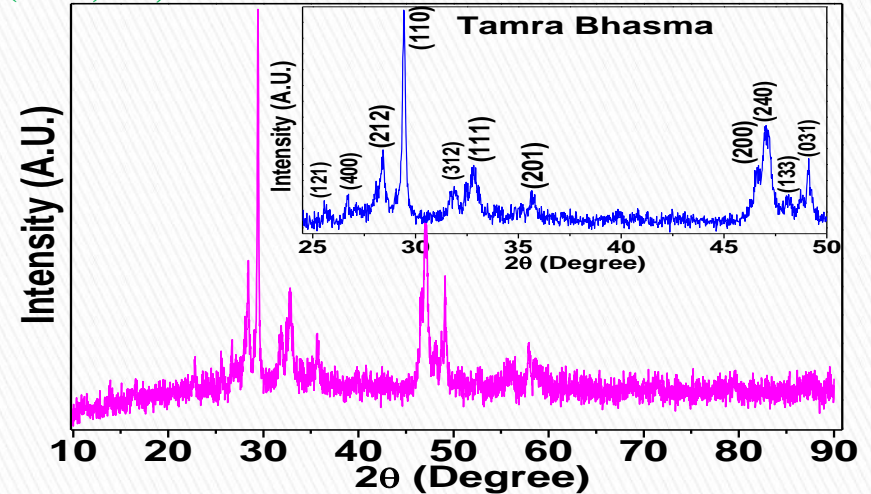
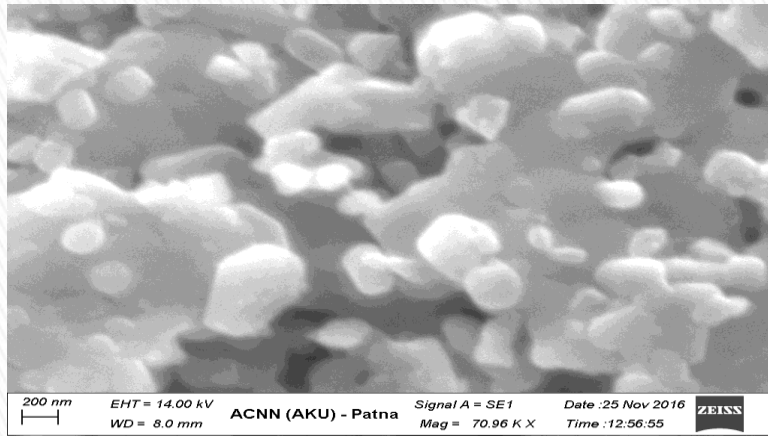
Physical Characteristics- Measurement - An Engineering Parameters



- All bhasma shows nanocrystalline materials using using Modern scientific tools. Various biomedication testing results shows that- be useful to control the bacterial infection disease and others.
- present study, scientific data obtained and evidence at AKU would support in utilizing the ancient Indian wisdom of Ayurveda for the development of newer drugs as a modern nanomedicine and open a path to understand the traditional Ayurvedic medicine at nanometric level and its use in various diseases.

Ayurvedic Bhasma as Nanomaterial's , Modern Scientific Tools and Magnetism for Engineering Applications

Rakesh Kr Singh, Sanjay Kr, Abhay Kr Aman, Manoranjan Kar, Internation J. Ayurvedic and Integrative medicine (2017)1-7, Elsevier



Structural, Microstructural and Magnetic measurement of Tamra bhasma reveal that bhasma are nanocrystalline super paramagnetic, uniform size distributed particles that support its medicinal value together with better action on disease treatment. This reminds our ancient Indian wisdom was so great. Hence we should not forget our root/ancestors.

Innovation in Basic and Applied Science and Frontiers Research for Society

Europe to bet up to €1 billion on quantum technology



Two similarly ambitious schemes showering money on a single topic, called Flagship projects, have been underway in the European Union since 2014. One focuses on the study of Graphene the other on the study of human brain .

Basic Sciences and Engineering

HINDUSTAN TIMES, PATNA
WEDNESDAY, APRIL 19, 2017



www.facebook.com/htedu

TCS, CMU tie up for research

HT Correspondent
letters@hindustantimes.com

NEW DELHI: A prestigious US university and Tata Consultancy Services have collaborated to set up a state-of-the-art facility which its promoters say would lay the groundwork for the fourth industrial revolution by conducting cutting edge research.

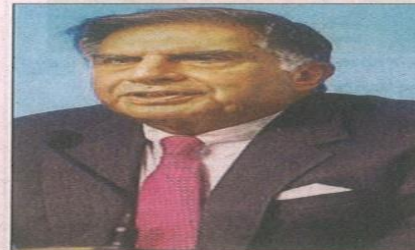
The collaboration comes more than a century after Jamshedji Tata came to this city known as the steel-making capital to understand technologies which he would later use to launch India's own industrial revolution.

Top Indian industrialist Ratan Tata, joined by Carnegie Mellon University president Subra Suresh along with Tata Sons chairman N Chandrasekaran broke the ground of the new TCS Hall at the university campus. Supported by an unprecedented \$35 million grant from TCS, which is the largest ever industry donation to the CMU, the building when complete by next year, would become the hub of CMU and TCS collaborations on promoting next generation technologies that will drive the 4th Industrial revolution, Suresh said.

"Today, we are not looking at heavy metal and millions of tons of steel. We are looking at a collaboration of intellectual skills and the development of two countries together that might bring about global understanding between people," Tata said.

Ratan Tata, Chairman emeritus of Tata Sons, described the CMU-TCS partnership a visionary collaboration of skills that will bring understanding between young people of India, the United States and other places in the world.

"The wide-ranging multi-national partnership that is creating new research opportunities, new student aid, and a brand-new facility for educational research that we are celebrating today has deep roots. In fact, the historical parallels and connections between the Tata Group of companies and Carnegie Tech and



Ratan Tata is excited about the collaboration MINT/FILE

Carnegie Mellon make this new chapter in our partnership even more meaningful," Suresh said. "In the late 19th century - years before this university was founded - the Tata family patriarch, Jamshedji Tata, came to Pittsburgh—the steel capital of the world—to learn from expert steelmakers how to launch his own steel-making business in India," he said.

"Years later, a company affiliated with one of Andrew Carnegie's executives landed a contract to build the Tata plant in India, bringing to life the Jamshedji Tata goal that mirrored Andrew Carnegie's life's work: the great steel empire built here in Pittsburgh, and a great university, Carnegie Mellon as we celebrate it today," he said.

Suresh said both institutions will collaborate on mutual interests in fields such as cognitive systems and autonomous vehicles and robotics.

"TCS Hall will house a variety of activities in education and research, as well as the CMU Mechanical Engineering and Robotics Departments. And it'll fit seamlessly into Carnegie Mellon's pioneering work."

Youth must be made to understand the beauty of doing science, the pleasure of doing science, and the ultimate bliss when results of science make you understand nature, master it, control it, and finally make things that improve the quality of life of humankind.



Developing Strong Scientific Human resource in Society

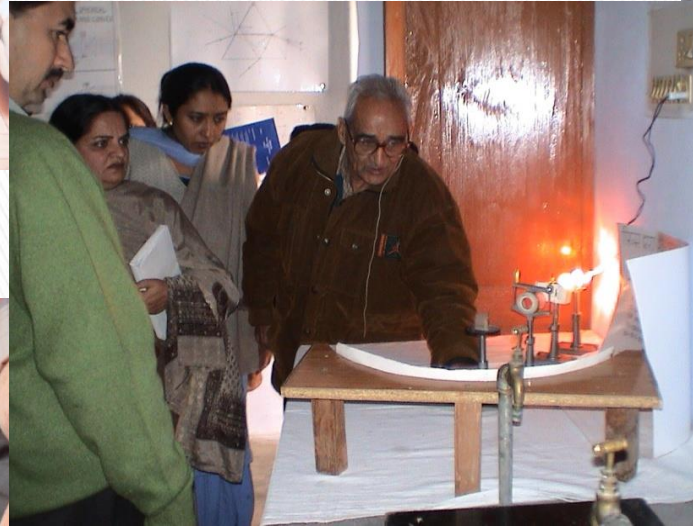
Anveshika Activities - Initiative of Prof. H.C.Verma, IIT Kanpur

Natural process of Learning through low cost experiment and Inspire for innovations at all levels of Study

An open laboratory to nurture Young Minds



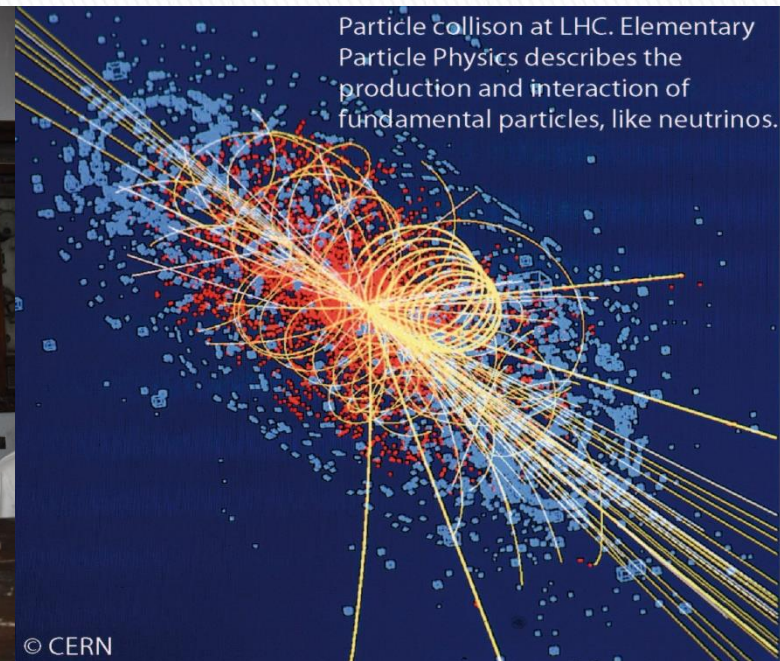
Anveshika Activities - Initiative of Prof. H.C.Verma, IIT Kanpur
Natural process of Learning through low cost experiment and Inspire for innovations at all levels of Study
An open laboratory to nurture Young Minds





Impact -We have demonstrated these experiments under various situations including regular classrooms/ special lecture session and found that when combined with right type of questions, they are very effective tools for concept-building and interest generation in Basic Science and Scientific Research of Interdisciplinary nature. About 25 teachers and 500 students are in came in close contact and working for science education, Research. Such activity also foster growth in higher education.

Confidence and Constructive energy Karma and Law of Nature



**My Teacher and Mentor, Prof. H.C. Verma Sir always Inspire-
Atambishavas(Confidence) is like a neutrino particle. No walls or mountain can
stop its motion. Even if earth comes in front of neutrino particles this particles can
penetrate in to the earth. Therefore a Person full of Enthusiasm and confidence can
create a Path of success.**

Rural India can lead through Innovation, Dedication and Love from nature & Science

The well known academician Prof. Yash Pal has said that “In atomic energy, space science, CSIR laboratories, maximum employees are from general engineering colleges, universities which are not accredited of national or international repute” . Therefore students and faculty members of nonaccredited institutions should also be promoted and they can perform well, if opportunities given them.



The article titled” Role model ne badaldiya jeevan ki disha” stated by Infosys Chairman – Narayan Murthy. In 1968, on a Sunday morning at IIT Kanpur, Murthy interacted with computer science engineers of America and learned many new things. After that he immediately read few books of computer science and choose a career in computer science



Society for Scientific Values: Delhi For Global Personality

- According to Article 51-A (h) of the Indian Constitution the duty of every citizen is to develop scientific temper along with humanism and a sprit of inquiry and reforms.
- It has also been stated in The Bhagwat Gita that our world civilization and societies have risen to a higher level not through mechanical or technological efficiencies but practising sound moral and ethical values



Thank you

