



M.Tech in Nanoscience and Nanotechnology

Admission-2023

PROSPECTUS

Interdisciplinary Subject for Atmanirbhar Society/Job and Progress of frontiers Knowledge
For Engineering Graduates (B.E / B.Tech) and Science Post-Graduate (M.Sc)
Aryabhata Knowledge University, Patna
website : www.acnn.akubihar.ac.in



Hon'ble Chancellor(Governor) and Hon'ble CM, Bihar, with other dignataries and , some higher Govt. officers and academicians visited Nanotechnology center/ Research activities. Prof. S N Guha, founder Vice Chancellor with Hon'ble CM , Bihar at the official inauguration of nanotechnology Center.

- ☑ Arbhattha Center for Nanoscience & Technology (ACNN) is non-traditional, super specialized, frontier areas of subject of 21st century& first cutting edge Research Centre of university of Bihar, equipped with 20 high-end research instruments such as Scanning Electron Microscope, Multiferroic system, Vibrating Sample magnetometer, High energy ball mill etc. This is only one such frontiers related academic center in universities of Bihar.
- ☑ The Nanoscience and nanotechnology center of Aryabhata knowledge University was Established by the founder Vice Chancellor Prof. S N Guha with whole hearted support and encouragement from Honorable Chief minister Sri Nitish Kumar Ji. The first academic session of M.Tech and Ph.D. started from academic from year 2013. The academic and research activities of this Center visited/appreciated by Hon'ble Governor cum Chancellor Universities of Bihar, Hon'ble Chief minister Sri Nitish Kumar Ji, Education ministers and various Govt. officers.

- ☑ Different affairs of academic, research & development programme are being carried out under the leadership of Dr. Rakesh Kumar Singh, head of the Nanoscience center(i/c) , who have been also awarded “Best Young Teacher with Contributions in modern field of Nanoscience” by Hon’ble Chancellor of university of Bihar cum Governor for his outstanding performance . Global level academic activities of Dr. Rakesh can be seen- National Research network (Vidwan) : <https://vidwan.inflibnet.ac.in/profile/339272> and <http://acnn.akubihar.ac.in>
- ☑ In the last 10 year more than 1000 eminent academicians/Scholars from different parts of world/country/state visited Nanoscience center of Aryabahtta Knowledge University. About more than 200 research papers published/ final progress in SCI/Scopus/WoS/Peer reviewed Journals by Nanotechnology center in multidisciplinary area of Science, Engineering & technology including Engineering Science, Agriculture, Electronics, Medicine, Food, and Ayurveda and Basic Sciences. 2 patents and 2 prototype have been filed/developed in the field of low cost LED, Agriculture and purification of water.
- ☑ Scientists/Academicians of About More than 100 countries of the world including China, USA, UK, Germany, others cited/appreciated/read the frontiers research activities of the nanoscience center. The International level research activities and world class scientific infrastructure can be seen-<http://acnn.akubihar.ac.in>.



Students and Faculty member of Nanoscience center participation in various innovative practices.



Nanotechnology Students awarded in Rajbhawan, Patna

Career/ Job prospects of M.Tech Nanotechnology Courses:

Nanoscience and Nanotechnology is an interdisciplinary research based subject, in which person from basic science, applied Science/Engineering, Medical science, Ayurveda , Agriculture can persue a career for Atma Nirbhar Society. At present nanotechnology programme are being offered in India at more than 40 institutions, in which some of the organizations are following –

1. Aryabhata Knowledge University, Patna
2. Punjab university Chandigarh,
3. University of Rajsthan,
4. Institute of Nanoscience & Nanotechnology Mohali
5. National Forensic Science Science University- an Institution of National Importance under ministry of home affairs, Govt. of India
6. Pandicherry university
7. Symbiosis University Hospital & Research Center
8. S N Bose National Center for Basic Sciences
9. JNU-Delhi
10. Delhi University
11. Amity university,
12. VIT
13. SRM University
14. Center for Nano & Soft Matter Sciences,
15. NIT-Bhopal
16. IIT Bomaby
17. I.I.ScBanglore
18. Amrita University
19. JIS university
20. Dr. A P J Kalam technical university Lucknow
21. BanasthaliVidyapith and Various others places

Till date about more than 1000 nanotechnology based products are in the global market.

Multidisciplinary Cutting Edge Nanomaterials Research activities at AKU



Production of Various functional Engineering, Food, Silica from rice husk, herbal nanomedicine, Iron oxide based nanomaterials at Nanotechnology center for its multifunctional applications in industries & Society.

These are some following sectors of M.Tech Nanotechnology degree for job/career. In addition to these sector, there are endless job/career opportunities.

SI	Category/Nature of Job	Product /Sector
1	Professor/Lecturer	Colleges/Universities/ Specialized research Institute, as mentioned above
2	Scientists/ Scientific Officer	In DRDO, BARC, Nano mission of DST-Govt. of India, Various CSIR laboratories, TERI Deakin Nano-Biotech Center Gurgaon, International research center for Powder Metallurgy and New materials and various others
3	Research Officer/ Energy Manager	National Institute of Rock Mechanics Bangalore, Indian Oil Corporation (IOC), Hindustan Petroleum Corporation Limited (HPCL), Bharat Heavy Electricals Limited (BHEL)
4	Chief Executive Officer (CEO)	Production industries of different Kind of Electronics nanomaterials, Ayurvedic Nanomedicine by various sectors. SRL company Ltd. Producing various Nanomaterials for its uses in agriculture, laboratory purpose etc. Nano-LED based Electronics Companies.
5	Cosmetics Industries	Various types of cosmetics are nanomaterials, which are available in the global market with scientific evidence.
6	In Industries- Reinste Nanoventures; Sunita Carbon Pvt. Ltd; IFFCO Pvt. Ltd; SISCO Research Pvt. Ltd as CEO/Technical executive	Production of various nanomaterials Related product, National Institute of foundry & Forge technology for iron based materials, Central manufacturing Technology Institute Bangalore, production of Carbon based nanomaterials, Nano-Urea
7	Pharmaceutical Industries for production of Various nano medicine as Scientist	Various nanomedicine for various diseases
8	Bajaj Pvt. Company Ltd as CEO/Technical executive	Bajaj fans with anti-viral, Anti-bacterial & Bye-Bye dust repellent feature
9	Century Ply Ltd. Hires CEO/Technical executive	Century Ply prepared formulated nano-engineering particles which stop the spread of fire, that saving life and valuables
10	HiQ-Nano. S.r.l and Symphoney company Pvt. Ltd and other	Production of Silica engineering Nanomaterials for bricks, Tiles, cement and fluorescent nanobeads
11	Winmarket Research Ltd.	Ferrite Magnetic nanomaterials for its uses as Electrical & Electronics/ Ceramics materials for its applications in Energy & Environment, Transformer core, Hydroelectric cell
12	Hydroelectric cell for Green Energy	Various product such as Candle, LED, Lamp, battery as green energy
13	Company- Motorola, Hitachi, Degussa	Production of Various nanomaterials for its applications in high resolution display, Cosmetics

General Instructions for 4-Semester Postgraduate Programme Leading to the Degree of M.Tech (Nano Science & Technology)

1. General Information

- 1.1. The M.Tech. Course on is being conducted by the Aryabhata Centre for Nanoscience & Nanotechnology (ACNN), Aryabhata Knowledge University, Patna.
- 1.2. The Semester system of education shall be followed in ACNN at M.Tech level. Each semester will be at least 90 working day duration. Every enrolled student will be required to do a specified course work and also complete a project/dissertation if any either in the ACNN or at other National Labs/Institutions.
- 1.3. The duration of the course is of four semesters (2 academic years). The duration can be extended to a maximum of six semesters (3 academic years). The maximum limit can be extended by 1 or 2 semester subject to the approval of university on case of case basis.
- 1.4. The total number of seats for the course is 20 (twenty). Reservation of SC/ST/OBC/PH/Women candidates will be done as per the University norms.

2. Minimum Eligibility for Admission

- 2.1. M.Sc. or equivalent degree in Physics/ Chemistry/ Electronics/ Electronics Science/Material Science/Biotechnology/Agriculture, with not less than 55% aggregate marks for General Category & 50% for all reserved categories in the absolute system of equivalent grade.

OR

- 2.2 Bachelor's degree in Electrical/ Mechanical/ Electronics & Communication/ Computer Engineering/ Instrumentation/ Computer Science/ Chemical/ Biochemical Engineering/ Medical/Veterinary Sciences or equivalent, with not less than or 60% aggregate marks for General Category & 55% for all reserved categories in the absolute system or equivalent grade.

3. Mode of Admissions

Admission to M.Tech. programme will purely on the combined merit of the M.Tech. Admission Entrance Test conducted by Aryabhata Knowledge University and performance at qualifying examination.

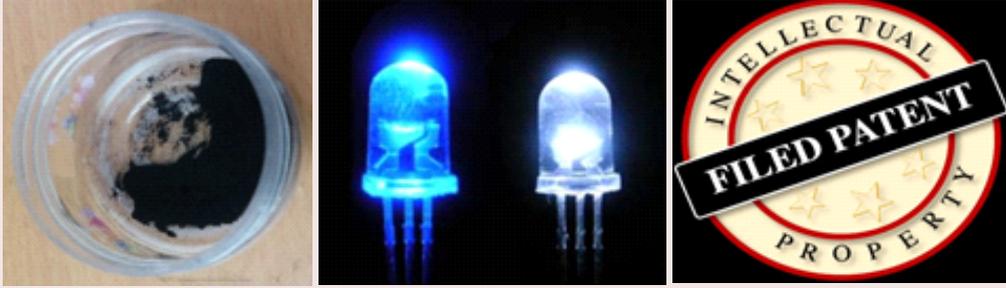
Research Finding of about more than 150 Published in International Journals with affiliation of nanotechnology center. Details of publications/Research activities can be seen- <http://acnn.akubihar.ac.in/>

More than 75 countries of the world including China, USA, Germany, UK, Japan etc. cited /appreciated the research activities of Nanotechnology center of Aryabhata Knowledge University, Patna

The image displays three journal article covers. The top-left cover is from 'Materials Science & Engineering B' (Elsevier), featuring the title 'Synthesis and properties of amorphous nanosilica from rice husk and its composites' by Arul Jyoti et al. The top-right cover is from 'Applied Physics A' (Springer), titled 'Synthesis and characterization of non-molar lithium-magnesium nanoferrite material for its applications' by Rakesh K. Singh et al. The bottom cover is from 'Applied Physics A' (Springer), titled 'Tailoring the physical properties of non-molar potassium-substituted magnesium ferrite nanomaterials and its applications in hydroelectric cell' by Rakesh Kumar Singh et al. The bottom-left cover is from 'Journal of Superconductivity and Novel Magnetism' (Springer), titled 'Studies on the Structural Properties and Band Gap Engineering of Ag⁺-Modified MgFe₂O₄ Nanomaterials Prepared by Low-Cost Sol-Gel Method for Multifunctional Application' by Uday Shankar et al.

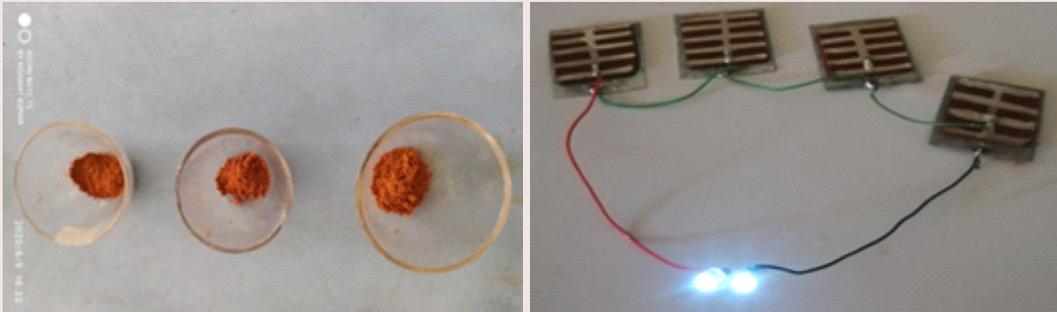
न्यूनतम लागत से तैयार बोरेटनैनोमैटेरियल्स से एलईडी हेतु प्रकाशकाउत्सर्जन एवं हाइड्रोइलेक्ट्रिकसेल का प्रोटोटाइप विकसित: नैनोटेक्नोलॉजी से सम्बंधित नवीनतम रिसर्च

आर्यभट्ट ज्ञान विश्वविद्यालय के नैनोसाइंस एवं नैनोटेक्नोलॉजी केंद्र के अध्यक्ष डॉ राकेश कुमार सिंह व उनके पीएचडी छात्र बिभूतिविक्रमादित्य ने लौह पदार्थ यीट्रियम एल्युमीनियम बोरेट नैनोपदार्थ को रासायनिक विधि से कम लागत में तैयार किया गया। इसके भौतिक एवं प्रकाशीय गुणों को विस्तार से आधुनिक उपकरण यथा -एक्सरेडीफरेक्ट्रोमीटर, स्कैनिंग इलेक्ट्रान माइक्रोस्कोप, फोटोलुमनिसेंस स्पेक्ट्रोमीटर, युभी-विजिबल स्पेक्ट्रोमीटर से किया गया। तैयार नैनो पदार्थ का साइज़ 1-100 नैनोमीटर के बीच पाया गया एवं पदार्थ से प्रकाश का उत्सर्जन अल्ट्रावाइलेट, ब्लू क्षेत्र एवं दृश्य क्षेत्र में पाया गया, जो लाइट एमिटिंग डायोड हेतु उपयोगी है। इस नये आविष्कार को भारत सरकार के वाणिज्य और उद्योग विभाग पेटेंट हेतु विचार आवेदन समर्पित किया गया एवं इस आविष्कार पर अग्रेतर करवाई हेतु आवेदन स्वीकार किया गया एवं प्रोविजनल पेटेंट आवेदन संख्या: 202331017221 प्रदान किया गया। इक्कीसवीं शताब्दी के नवीनतम विधाओं से सम्बंधित नैनोटेक्नोलॉजी के क्षेत्र में इस तरह के प्रकाश उत्सर्जन से चुम्बकीय प्रकाश उपकरण से लेकर सम्बंधित क्षेत्र में पुरे विश्व के रिसर्च के क्षेत्र में नये ज्ञान को बढ़ाने में सहयोग प्राप्त होगा। बनाये गये पदार्थ का एनर्जी बैंडगैप प्रकाश उत्सर्जन हेतु उपयुक्त पाया गया है।



तैयार नैनो पदार्थ एवं उनसे उत्पन्न हो रहे ब्लू एवं सफेद प्रकाश

इसके अतिरिक्त हरित उर्जा उत्पादन हेतु हाइड्रोइलेक्ट्रिकसेल जो चुम्बकीय नैनोपदार्थ से बनाया गया है, प्रोटोटाइप आर्यभट्ट नैनोविज्ञान एवं नैनोप्रायोगिक केंद्र के अध्यक्ष डॉ राकेश कुमार सिंह एवं उनके पीएचडी छात्रों, अनिकेत मानस द्वारा किया गया। इस रिसर्च को अंतर्राष्ट्रीय जर्नल "जर्नल ऑफ मैटेरियल्स साइंस एवं मटेरियल इन इलेक्ट्रॉनिक्स" में प्रकाशित हुआ है। इससे सम्बंधित रिसर्च यहाँ के एमटेक, पीएचडी छात्रों द्वारा व्यापक स्तर पर किया जा रहा है। हाइड्रोइलेक्ट्रिक सेल की विशेषता है कि इस पर दो बूंद पानी डालने से बिजली का उत्पादन होता है, जो कम लागत से तैयार होता है एवं जिससे वातावरण प्रदूषित नहीं होता है। राष्ट्रीय भौतिकी प्रयोगशाला- नई दिल्ली के महान वैज्ञानिक डॉ आर के कोटनाला एवं डॉ ज्योति साह के सहयोग से यह कार्य किया जा रहा है एवं इससे सम्बंधित उद्योग स्थापित करने का प्रयास जारी है। यह हाइड्रोइलेक्ट्रिक सेल का उपयोग लैंप, मोबाइल टोर्च, लैंप टॉप चार्जर, हाइड्रोजन गैस का उत्पादन हेतु उपयोगी है।



तैयार किया गया मैग्नीशियम फेराइट चुम्बकीय नैनो पदार्थ, विकसित हाइड्रोइलेक्ट्रिक सेल एवं उससे उत्पन्न बिजली

Waste-To-Wealth, -Towards a Sustainable Zero-Waste in a Circular Economy

* Low cost production of superfine Nano scale Eggshell powder from waste Egg shell and its applications for Purification of water

Highlights of Patents and Expected outcome

Prepared Nano scale Powder of waste egg shell and its superfine behaviour, crystal structure , Physical properties are measured using modern scientific tools- X-ray diffraction, Scanning Electron Microscope, High energy ball mills, Nanoparticle tracking analysis System (NTA) etc. Scientific studies shows that Remediation of arsenic from arsenic contaminated water through nanomaterial and nano membrane. Developed prototype of low cost device/filter for arsenic remediation and filed patent. Plan for Set up industry/ start-up for employment generation and economic development. Such start-up will be 1st kind in state Bihar, to the best of my Knowledge. Product (egg shell Powder) originates from eggshell waste material , which is eco-friendly and Low cost. It will help to set up an industry/ start-up for employment generation and Knowledge for society. Encourage young researchers to think out of the box and help them to think beyond academic for betterment of society. It will help in establishing linkages between academic institutes and corporate world.

ipindiaonline.gov.in/epatentfiling/PATForms/frmFORM-5.aspx

Government of India
Ministry of Commerce & Industry
Department of Industrial Policy & Promotion
Controller General of Patents Design & Trade Marks
Online Filing Of Patents

INTELLECTUAL PROPERTY INDIA

Quick Form Filing

- Reply for Patent Prosecution Highway (PPH)
- All Form
- New Application
- PCT National Phase Application
- File Form 2
- File Form 9
- File Form 13
- File Form 18
- File Form 28
- FORM 30 (NEW)
- Renewal of Patent
- Reply to Examination Report
- Petition under rule 6(i)
- Fifth Schedule
- Form History
- Payments/Submission

Declaration As To Inventorship - Form 5

Application Number: 202331040687
Date of Filing: 14/06/2023
Title Of Invention: WASTE EGG SHELL BASED LOW COST WATER FILTRATION SYSTEMS
Address Of Service: Head Aryabhata Centre for Nanoscience & Nanotechnology, Aryabhata Knowledge University, Mithapur, Patna, Bihar – 800001, India, 0612-2351919 +91-7050030308 ; +91-9304197595 abhayaman.aku@gmail.com rakeshingpu@gmail.com ashutipume@gmail.com orissa.patbuddy17@gmail.com

Sr.No.	Applicant Name	Applicant Type	Address
1	Aryabhata Knowledge University	EI	Aryabhata Centre for Nanoscience & Nanotechnology, Aryabhata Knowledge University, Mithapur, Patna, Bihar, India 800001

Sr.No.	Inventor Name	Inventor Country	Inventor Nationality	Address
1	ABHAY KUMAR AMAN	India	India	Aryabhata Centre for Nanoscience & Nanotechnology, Aryabhata Knowledge University, Mithapur, Patna, Bihar India - 800001
2	RAKESH KUMAR SINGH	India	India	Aryabhata Centre for Nanoscience & Nanotechnology, Aryabhata Knowledge University, Mithapur, Patna, Bihar India - 800001
3	ASHUTOSH KUMAR	India	India	Aryabhata Centre for Nanoscience & Nanotechnology, Aryabhata Knowledge University, Mithapur, Patna, Bihar India - 800001

ipindiaonline.gov.in/epatentfiling/PATForms/frmFORM-5.aspx

Government of India
Ministry of Commerce & Industry
Department of Industrial Policy & Promotion
Controller General of Patents Design & Trade Marks
Online Filing Of Patents

INTELLECTUAL PROPERTY INDIA

Quick Form Filing

- Reply for Patent Prosecution Highway (PPH)
- All Form
- New Application
- PCT National Phase Application
- File Form 2
- File Form 9
- File Form 13
- File Form 18
- File Form 28
- FORM 30 (NEW)
- Renewal of Patent
- Reply to Examination Report
- Petition under rule 6(i)
- Fifth Schedule
- Form History
- Payments/Submission

Declaration As To Inventorship - Form 5

Application Number: 202331017221
Date of Filing: 14/03/2023
Title Of Invention: A PROCESS FOR PREPARATION OF YTTRIUM ALUMINIUM BORATE BASED FUNCTIONAL NANOMATERIAL FOR LIGHT EMITTING DIODE
Address Of Service: Head Aryabhata Centre for Nanoscience & Nanotechnology, Aryabhata Knowledge University, Mithapur, Patna, Bihar – 800001, India

Sr.No.	Applicant Name	Applicant Type	Address
1	Aryabhata Knowledge University	EI	Aryabhata Centre for Nanoscience & Nanotechnology, Aryabhata Knowledge University, Mithapur, Patna, Bihar, India

Sr.No.	Inventor Name	Inventor Country	Inventor Nationality	Address
1	Sibhat Bikramaditya	India	India	Aryabhata Centre for Nanoscience & Nanotechnology, Aryabhata Knowledge University, Mithapur, Patna, Bihar, India - 800001
2	Rakesh Kumar Singh	India	India	Aryabhata Centre for Nanoscience & Nanotechnology, Aryabhata Knowledge University, Mithapur, Patna, Bihar, India - 800001
3	Ranjit Kumar Verma	India	India	Aryabhata Centre for Nanoscience & Nanotechnology, Aryabhata Knowledge University, Mithapur, Patna, Bihar, India - 800001
4	Nishant Kumar	India	India	Aryabhata Centre for Nanoscience & Nanotechnology, Aryabhata Knowledge University, Mithapur, Patna, Bihar, India - 800001

Add Additional Inventor(if any)

World Class Nanotechnology Research laboratory and Research Activities



High Energy Ball Milling for Production of Nanomaterials;



FTIR and Impedance Analyzer measurement



Vibrating Sample Magnetometer for Magnetic Measurement



High temperature Muffle Furnace



Microinjection moulding machine for Composite



Learning Science through Low Cost Experiment Lab



Scanning Electron Microscope



Atomic Force Microscope and Scanning Tunneling Microscope

World Class Nanotechnology Research laboratory and Research Activities



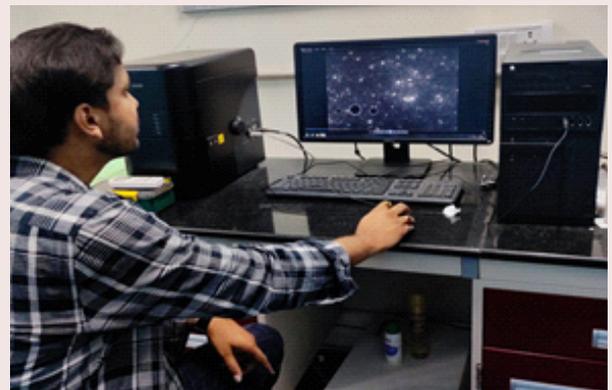
X-ray diffractometer for crystalline size/structure measurement



Thermal Analysis Laboratory



UV-Visible and PL spectroscopy Laboratory



Nanoparticle Tracking Analysis System



Zeta Potential Measurement Lab



Hydrothermal Technique for Material synthesis

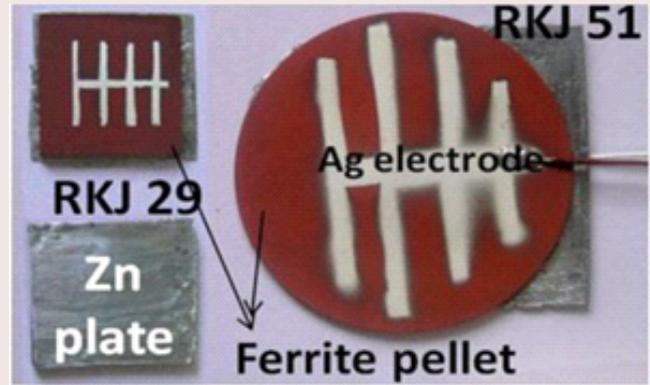
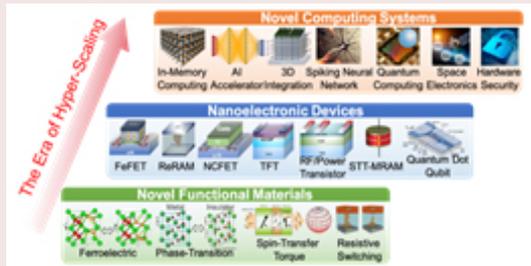
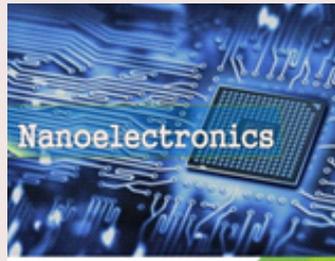


Multiferroic Instruments



Nanomaterials Simulation Lab

Some of the Nanotechnology products available in market



Hydroelectric Cell for Green Energy Production

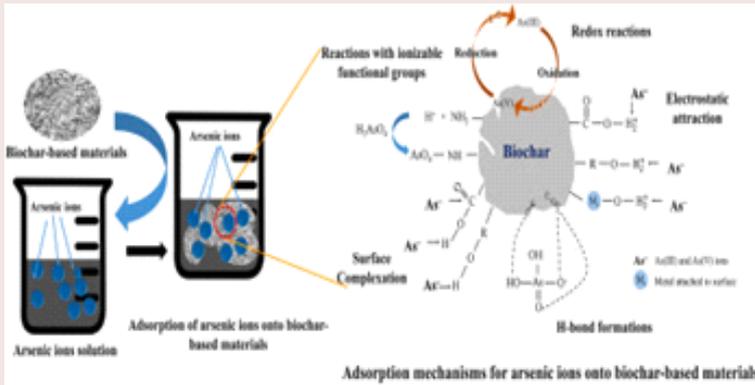


Nanotechnology based paints

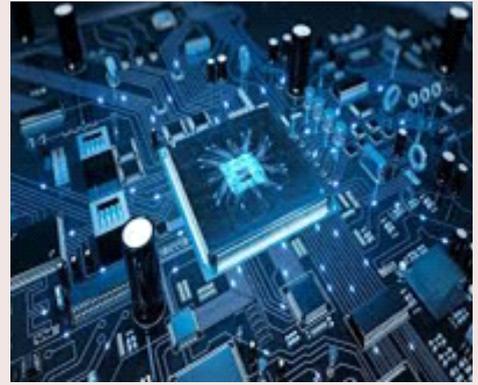


Dust and antimicrobial free Fan

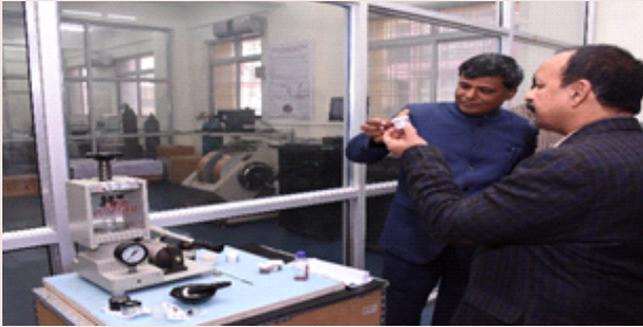
Some of the Nanotechnology products available in market



Production of Nano-Biochar for purification of water



Nanotechnology Electronics Chip



Production of Nano-Electronics Powder Materials at Nanotechnology Center, Aryabhata Knowledge University

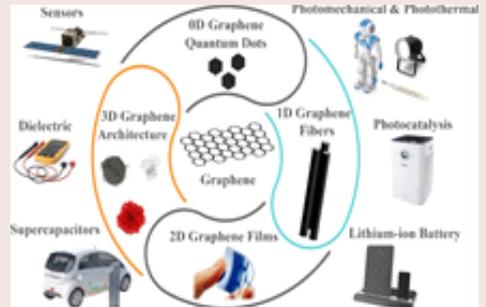


Nanomedicine and healthcare

Nanotechnology in cosmetics



Nanotechnology based water filter



Multi functional engineering Silica and graphene Nanomaterials

Some of the Nanotechnology products available in market and Achievement of Nano Science Center of Aryabhattha Knowledge University Patna



School/Colleges/ University faculty members/Students Visited ongoing Research activities and research infrastructure of AKU



Nanotechnology Faculty Dr. Rakesh Kr Singh awarded Best Young Teacher Award by Hon'ble Chancellor (Governor) for his outstanding Performance and Hon'ble CM, Bihar Sri Nitish Kr Ji appreciated ongoing Nano Technology related academic activities.

M.Tech in NANOSCIENCE and NANOTECHNOLOGY

**ARYABHATTA KNOWLEDGE UNIVERSITY,
PATNA, BIHAR - 800001**

FOR MORE DETAILS



+91 8102926986



akuacnn@gmail.com



www.acnn.akubihar.ac.in