Brief Introduction-Website. www.drrakeshsingh.com,

Dr. Rakesh Kr Singh, **39 years**, born at Kasamra Village of Purnea district of Bihar, did Ph.D and Post-Doctoral work in Nanoscience field and worked on Ferrite Magnetic nanoparticles, Nanoalumunate, Nanochromite and presently working on Ayurvedic bhasma & nanomedicine, Food nanomaterials and synthesis of Silica nanoparticles from rice husk.and some others related work At present Dr. Rakesh is Head, University Centre of Nanoscience & Nanotechnology, under school of Engineering and Technology of Aryabhatta Knowledge University Patna(Joining date 2nd Sep. 2013). **He has also Worked as an Asst. Professor of Physics in NAAC- A Grade with CGPA 3.51/4 & College with Potential for Excellence (CPE) status, accorded by UGC, institute-Patna Women's College, Patna university, Since August 2004 to 1st September 2013.** Apart from Teaching-Learning & Evaluation and Co-curricular activities, he has guided and worked in UGC-Sponsored Research Projects under 'College with Potential for Excellence' (CPE) status scheme, Basic Scientific Research (BSR), UGC- Govt. of India, Special scheme, Minor Research Project(MRP) (Total Projects: CPE : 09, MRP:01 and BSR : 07 = 17). He has been the Organizing secretary/ Conveners/ Coordinators of more than 60 conferences/ Seminars/ of International/ National repute along with keen interest in innovative Science teaching in class room through low cost / No cost experiments. Such innovative practices helps in demystifying Science, developing Scientific thinking and create science especially Physics learning interesting. He has published more than 70 publications and has experience of more than 14 years at B.Sc., M.Sc., M.Tech, and Ph.D. level. Total 2 Ph.D. students awarded degree in the field of Food-Bio Nanotechnology and Ayurvedic Bhasma as a Nanomedicine and 6 Ph.D. are working under his supervision. 9 M.Tech students are working under his supervision and 11 M.Tech students completed their project thesis/ awarded degree, in the field of Food-Bio nanotechnology, Nano-Electronics, Nanotechnology in Environment & Agriculture. He has also guided more than 40 students in research project at UG level under potential for excellence and Basic scientific research scheme of UGC scheme.

He has received many recognitions, such as : Senior Resource Person of Utsahi Physics Teachers/ Anveshika Coordinator, coordinated by Prof. H.C.Verma, Dept. of Physics, IIT Kanpur in May 2009(www.hcverma.in), Young Scientist Award in 1st Global Bihar Science Conference held at Patna Science College, Patna University in May 2008, Master Resource Person of International Year of Physics – 2005, International year of Astronomy – 2009 (Trained by DST, Govt. of India and proclaimed by united nations) and invited by DST, Govt. of India to attend the Interactive meet of Nobel Laureates' and Science Icons of European Union, Germany held Vigyan Bhawan, New Delhi on 8th February 2007. Recently in 23-25 Aug. 2016 at Stockholm, Sweden in European Advanced Material Congress-2016, Dr. Rakesh presentation on "Ayurvedic Bhasma & Nanomedicine- An Ancient Wisdom" and his presentation was highly appreciated at European Advanced Material Conference and Executive Chairs felicitated to him. Over the last 10 years, Dr. Rakesh is also working for Revitalization of Science education and inspire for research in academic institutions and in this process, he interacted more than 5,000 students and 1000 teachers across the country. He is member of various academic bodies such Post-Graduate Research council, Board of studies, Coordinator/ Executive council member of National Anveshika Network of India, coordinated by Prof. H.C.Verma, IIT Kanpur and Society for Scientific Values, Delhi, Coordinated by Prof. K.L.Chopra, former director, IIT Kharagpur of and most importantly he Established a world class Nanomaterial research laboratory at Aryabhatta Knowledge University, Patna as a Professor in charge-Establishment and at present he is carrying out the responsibility of head of the nanoscience center for Post-Graduate studies and Doctoral Research.

1. **Present Position and Total work Experience : Dr. Rakesh Kumar Singh(till Nov. 2018)**

1.1. Asst. Prof. cum Head/ Professor in charge-Establishment, University center for Nanoscience & Technology(from 2nd Sep.2013) Aryabhatta Knowledge University, Patna, India, Mob- 09304197595**, mail-rakeshsinghpu@gmail.com**

1.2. **9 year (1st Aug. 2004 to 1st Sep. 2013) of Teaching and Research Experience as an Assistant Professor (Regular) in an Accredited & Centre for Excellence Institute of National repute at Patna Women's College**, Patna University, NAAC Re-Accredited – 'A' Grade of CGPA- 3.51 out of 4, 'College with Potential for Excellence' (CPE) status accorded by UGC, Total work experience ~ 14 year

Aryabhatta Knowledge University (AKU) Technical cum 1st Professional university of Bihar and objective of this university is facilitate and encourage teaching, research and extension in the matter connected with professional, technical and frontier areas of subject, such as nanotechnology. The Aryabhatta centre for Nanoscience and Nanotechnology is the first research center related to frontier area of subject of 21st century under converging technologies. M.Tech and Ph.D. program is being conducted from the year 2013(working from 2nd Sep.2013).

Mentors for my academic activities: Thankful for Guiding/ Mentoring

Prof. H.C Verma
IIT Kanpur

Padmashri Prof. K.L Chopra,
Ex-Director, IIT Kharagpur University

Prof. Avinsh C Pandey,
Vice Chancellor, Jhansi

Dr. Amarendra
Patna

Dr. R. K Kotnala
NPL-CSIR Delhi

Prof. S.P Verma
Chairman-NCSTC-Delhi
Ex.Univ Prof & Head, P.U

Prof Asheshwar
Yadav Former
Vice Chancellor

Prof. Ranjit K Verma
Vice Chancellor
Munger Univer

Prof. Dolly Sinha
Pro Vice Chancellor
Patna University

Patna women's College is Constituent unit of Patna University is 'A' Grade institution with a cumulative Grade point average (CGPA) of 3.58 out of 4 and also College with potential for excellence status (CPE) status accorded by UGC , was established in 1940. This college got autonomous status from UGC (worked from 1st Aug.2004 -1st Sep. 2013)

Notable Contributions/ Achievment/Experiences: A Summary

2. Evidence of Ph. D degree with Post-Doctoral Research experience.

Ph.D. degree awarded in **May 2008** and **Post-Doctoral** Research Project Completed in May 2009 in the area of Nanoscience

3. Evidence of Scholarly Research papers in Impact factor/ reviewed Journals and Proceeding and Contribution to Educational/ Curriculum development Total no. of papers/ Chapter in a Book/ CPE abstracts/ M. Sc books (Total =2) published = **75**

Total Citation = 155

4. Evidence of attracting Research Grants/ Projects from UGC/ Others and Demonstrated leadership of Guidance/ working of UG/PG/Ph.D./ Post-Doctoral Research

I. UGC-Minor Research Project on ferrite Nanomaterials Completed Total no = 1
II. Basic Scientific Research Project of UGC (UG level) Guide =7
III. College with Potential for Excellence status scheme of UGC-Research project Guided = 9
IV. Post-Doctoral research project completed = 1

Total Project = 18

V. No. of M.Tech Project Guided =11
VI. No. of M.Tech Project in Progress =09
VII. No. of Ph.D. guided =02
VIII. No. of Ph.D. guidance in Progress = 06

5. Evidence of Contribution to Educational /Research/Learning through low Cost experiments, Counselling of teachers, Consulting services and participation etc.

I. Engaging as Resource person in refreshers course/ Seminars /Conferences etc. Total no ≥65
II. No. of Conferences/ Seminars/ workshops, Organized ≥ 45

6. Establishment of Research based Institutions/ Centers

Established a world class Materials Science and Nanotechnology Research center as a Professor incharge-Established/ Head of the center of worth of about 20 crore, prepared ordinance for master and Doctoral level research course and related different affairs of Establishment work at Aryabhatta Knowledge University, Patna.

7. **Skill and Expertise**

I. Nanotechnology in Electronics, Nanotechnology in Ayurveda, Nanotechnology in Food, Nanotechnology in Agriculture
II. Teaching **Physics** through low cost experiment and Science & Technology popularization
III. Teaching at Ph.D., M.Tech, B.Sc, +2 level

Research Publications as author/co-author (Last 5 years in peer reviewed Journal)

Nanotechnology in Ayurveda Science

1. Study on Physical properties of Ayurvedic TamraBhasma as nanomedicine, J. of Ayurveda and Alternative medicine. DOI.10.1016/j.jaim/2017.03.001.
2. Crystal Structure and Magnetic Property Studies on NanocrystallineLauh (Iron) Bhasma-An Ayurvedic Medicine, Int. J. Ayu. Alt. Med., 2016; 4(1).
3. Evaluation of iron oxide nanoparticles (NPs) on aging and age related metabolism and physiological changes in *C.elegans*. Article ID- IJPSR/RA-7880/02-17, International J. of Pharmaceutical sciences and Research.
4. Study of Ayurvedic Nanocrystalline*Tamra* and *Sankh*Bhasma physical Characteristics by Employing Modern Scientific tools and Applications,ISBN: 978-91-88252-02-9 and DOI: 10.5185/eamc2016, **European Advanced Material Congress, Stockholm, Sweden (2016).**
5. Physical properties of an Indian based Ayurvedic Medicine (*Shankh Bhasma*) as Nano materials for its application, Indian Journal of Community medicine (2018), reported.
6. **S**tudy on physical properties of Indian based Ayurvedic medicine- Abhrakh bhasma as Nanomaterials by employing modern scientific tools. GSC Biological and Pharmaceutical Sciences, Under Review, manuscript ref No. GSCBPS-2018-0100(2018).

Currently invited to

7. Write a text book and Working on Ayurvedic Bhasama as Nanomedicine by Limbert Publication, Germany(This offer is result of Research paper presentation in international conference at Stockholm, Sweden)

Nanotechnology in Food and Agriculture

8. A low cost nanotechnological approach for fruits and vegetables processing, © PESB, ISSN 2347 – 4866, May & Dec. 2014, pp 49 – 52.

9. Effect of high energy ball milling on physic-chemical, structural and morphological studies of Bitter melon Nano-powder. International Journal of Recent scientific Research.8 (2017)19258-19263.

10. Effect of high energy ball milling on physic-chemical, structural and morphological and optical properties of Curcuma Longa Nanoparticles powders, International journal Pharmaceutical Science and Research.9(2017)1000-06.

11. Synthesis and Characterisation of Amorphous and Crystalline Nano silica from Agriculture waste (2018), Material Science and Engineering B (reported)

12. Curcumin and Bitter guard nanoparticles and its biomedical applications- Progress for publication**.**

Nanotechnology in Functional Magnetic Electronics Nanoparticles

13. Magnetic and Dielectric Properties of Rare Earth Substituted $Ni_{0.5}Zn_{0.5}Fe_{1.95}R_{0.05}O_4$ (R= Pr, Sm & La) Ferrite Nanoparticles, Material Science and Engineering: B, **DOI-10.1016/J.mseb,2016.03.011. Elsevier**

14. Tuning of magnetic property by lattice strain in lead substituted cobalt nanoparticles, Materials Science and Engineering B. 220 (2017) 73-81.

15. Competition between strain and super exchange mediated Magnetism in modified Cobalt ferrite nanoparticles, Manuscript ID-K-146, American Institute of Physics (AIP)

16. Low temperature synthesis of hexagonal Barium hexa-ferrite nanoparticles by annealing at 450C followed by quenching, JTAC- Springer, DOI: 10.10007/s10973-017-6247-y

17. Low Temperature Preparation and Effect of Pr^{3+}, La^{3+}, Sm^{3+} and Gd^{3+} Substitution on Structural, Magnetic and Dielectric, Studies of $Ni_{0.5}Zn_{0.5}Fe_2O_4$ Ferrite Nanoparticles, International Journal of Innovative Science and Modern Engineering (IJISME).Vol.3(2015)1-6.

18. Structural, Magnetic & Dielectric behavior of $Ni_{0.5}Zn_{0.5}Fe_{1.99}R_{0.01}O_4$**Nanoparticles**; R= Pr, Sm and Gd, synthesized using Citrate Precursor method, annealed at low temperature450^0C, Int. J. of Engineering & technical research, 2(2014)125-130.

19. Synthesis of $NiFe_2O_4$ and $MgFe_2O_4$**nanoparticles** through citrate precursor method, annealed at 650C and study their structural & Magnetic properties, proceeding of National conference, VVIT, **ISBN**-978-81-925776-9-2, (2014) p.72-74.

20. Magnetic interaction between ferromagnetic $CoFe_2O_4$ and antiferromagnetic NiO, Physica B-Physics of condensed Matter.530 (2018)114-120.

21. Surface anisotropy induced magnetism BTO-CFO Nano-composite, J.Magn.Mag. Mater.465 (2018)93-99.

22. Effect of lattice strain on structural and Magnetic properties of Ba-hexa ferrite nanoparticles, J.Magn.Mag.Mater. 458(2018)30-38

23. Evidence of exchange coupled behaviour in Cobalt-chromium Ferrite Nanoparticles.J.Magn.Mag. Mater.456 (2018)118-123.

24. Optical and Magnetic behaviour of ZnO nanomaterials, J. Alloys & Compound (2018), reported.

25. Barium Hexa Ferrite nanoparticles, Magnetism and Applications (2018), J. Mag. Magn. Mater (2018), under review.

26. Modification of Photoconductivity and PL spectrum of ZnO**nanoparticles** through co-doping with Sr and Cd,The Journal of Physics, **Photon** an **International** Journal 107(2013)160-167,

27. Study of Structural and Optoelectronic Properties of ZnOCodoped with Ca and Mg **Hindawi** Publishing Corporation Indian Journal of **Materials Science** Volume 2013, Article ID 405147 (2014) p.1-6 http://dx.doi.org/10.1155/2013/405147,

28. Cytotoxic effect of Nanocrystalline Barium hexaferrite Nanoparticles on multi drug resistant Mycobacterium Tuberculosis, Paper. ID-218, J. IEEE-Xplore accepted in Nanotechnology for Instrumentation and measurement workshop-An International Conference.

29. Tuning of Magnetic property in Lead Iron Niobate, AIP procedding(reported).

30. Nb doped LithiumTitanate electrode for cell applications, Int. J. Eng. Enov(reported)

31. Nanotechnology: A Future for cancer diagnosis and treatment, Patna University Journal.3 (2015)65-72.An opportunity to know the importance of Science & Scientist for shaping the society, International J. of Engineering and Technical Research...3(2015)112-115.

32. Nanotechnology: Emerging technology of 21st century (**full length article-one page**), Dainik Jagaran, Jagaran Josh, Patna-Lucknow edition.14th March (2016).11

33. Creating interest in Physics Learning and Developing Scientific Temper through low cost - no cost Demonstrations, Proceeding National. Conference on **Educational technology in teaching and learning: Prospects and Challenges**,(2013).77-82, **ISBN-978-81-927627-1-5**.

34. Some College and University level experiments that foster research driven learning, proceeding, Int. J. Advance Research in science and Engineering. 6(2017).

35. Correlation between lattice strain and Physical properties of perovskite-spinel composite nanomaterials. **J. Appl. Physics**. JAP-AR-05792(2018). Under review

Books/ Course Materials published

36. Physics of Nanomaterials, Jan 2017, M.Sc, Paper XI of Nalanda Open University, P.05-212.

37. Statistical Physics, Jan 2017, M.Sc, paper IV of Nalanda Open University, p.05-120.

Minor Research Project Submitted in March 2014, Sponsored by UGC

38. Title of the Research Project-Study of composition and annealing temperature effect on structural, electrical and magnetic properties of some rare earth ions substituted Ferrite **Nanoparticles.,** UGC approval no. **: F.PSB-43/11-12(ERO)**

Abstract of Research presentations Published in International / National

39. Modification in photoconductivity of ZnO nanoparticles due to co-doping with Sr and Mg prepared by chemical method**, International Conference on Nanoscience and Nanotechnology-2013, Central university of Lucknow,** P.235

40. Change in structural, Optical and Photoconductivity properties of ZnO nanoparticles due to co-doping with Sr and Ca and made by chemical method, **National Conf. On Emerging Trends in Condensed matter Physic**s, Jan-2014, P. 17.

41. Low temperature synthesis of Barium hexa-ferrite nanoparticles using Citrate precursor method, in **11th International Quadrennial European Symposium** on Thermal Analysis and Calorimetry at the **Helsinki, Finland** on **August 14, 2014**

42. Some Possible applications of ferrite nanoparticles, **International conference** on Science & Technology (BSC-2015), 24th Dec. 2014, P.

43. Magnetic and Photoluminescence studies of some ferrite **nanoparticles**, 2014, Natn. Conf. On photonics**, IIT Patna**, **P.108.**

44. Physical science book by Cambridge scholars publishing, in progress for publication.

Research Publications as author/co-author (Before last 5 year)

Publications: International/ National Journal/ Proceeding as a author/ co-author etc.

Papers of Scientific Research on Nanomaterials (Magnetic Nanomaterials):

1. **Rakesh Kumar Singh,** B.C. Rai, Kamal Prasad, Synthesis and Characterization of Cu substituted Cobalt ferrite nanoparticles, **International Journal of Advanced Materials Science**, Vol. 3, No.2 (2012), pp. 71-76

2. S. Bhagat, K. Amar Nath, K.P. Chandra, **R.K. Singh**, A.R. Kulkarni, K. Prasad ,The structural, electrical and magnetic properties of perovskite (1-x)Ba Fe1/2Nb1/2)O3–xBaTiO3 ceramics, **J. Advanced Materials Letters**, DOI- 10.5185/amlett.2013 fdm.28(2013)

3. **Rakesh Kr Singh**, K. Prasad, D.P. Singh , R.N. Roy , R.S. Yadav, A.C. Pandey, On the magnetic and photoluminescence properties of Calcium diferrite ($CaFe_4O_7$)nanoparticles,"**International Journal of Material Science and Electronics Research,** Vol.3 No.1 (2012)p.1-7.

4. M. Abdullah Dara, Vivek Verma, S.P. Gairola, W.A. Siddiqui**, Rakesh Kumar Singh** R.K. Kotnala, Low dielectric loss of Mg doped Ni–Cu–Zn nano-ferrites for power applications, **Applied Surface Science** , **Elsevier**, Volume 258, Issue 14, (2012), P. 5342–5347

5. **R. K. Singh** , A. Narayan, K. Prasad, R. S. Yadav, A. C. Pandey, A. K. Singh,L. Verma, R. K. Verma, Thermal, structural, magnetic and **photoluminescence** studies on cobalt ferrite nanoparticles obtained by citrate precursormethod , JTAC-Springer,(2012)DOI 10.1007/s10973-012-2728-1

6. M. K. Mishra, R.S. Yadav, **R.K. Singh**, A. Narayan, A.C. Pandey, Effect of Murcuric Oxide doping on optical properties and strain in Zinc Oxide nanoparticles, Proceeding, Lucknow Journal of Science, Vol. No. (2011) p.84-88.

7. Nanophosphour : A Luminiscent Materials , A.C. Pandey, **Rakesh Kumar Singh** , proceeding, Nanoscience & Nanotechnology, Patna Women's College,(2008)p.5-11

8. **Rakesh Kumar Singh**, A.Yadav, A.Narayan, M.Chandra and **R.K.Verma**, Thermal, XRD and magnetization studies on $ZnAl_2O_4$ and $NiAl_2O_4$ spinels, synthesized by citrate precursor method and annealed at temperature 450^{o}C and 650^{o}C, J. Thermal, Analysis& Calorimetry-**Springe**r, DOI 10.1007/s10973-011-1860-7 (2011)

9. **Rakesh Kumar Singh,** A. Yadav, A. Narayan, Samar Lyeak, **H. C. Verma,** Structural, Magnetic and Mossbauer studies of Nanocrystalline Ni-Zn Ferrite, Synthesized using Citrate precursor method, Manthan, Int. J, Vol.12(2011)9-11

10. **Rakesh Kumar Singh**, A.Yadav, A.Narayan, Amarendra Kr Singh, L.Verma and **R.K.Verma**, Thermal, structural and magnetic studies on Chromite spinel , synthesized by citrate precursor method and annealed at temperature 450^{o}C and 650^{o}C, J.Therm Anal Calorim- **Springer**, DOI 10.1007/s10973-011-1869-y (2011)

11. **Rakesh Kumar Singh**, A. Narayan, S.B.Ansari, Hg Fe_2O_4 and Cd Fe_2O_4 Ferrite Nanoparticles synthesized by annealing temperature at 450^{o}C : Structural, Magnetic and Photoluminiscent properties, **Millenium series**, Mendel, Int. J. vol.27(3-4), 89-92(2010).

12. **Rakesh Kumar Singh, A**. Narayan, R.N.Roy and. **Avinash C. Pandey**, Preparation of mixed phase Strontium Ferrite and effect on Magnetic properties, Manthan, Int. J. Vol.13 (2012) p.26-29.

13. **Rakesh Kr Singh**, C. Upaadhyay, Samar Lyeak, A. Yadav, Cations distributions in $Ni_{0.5}Zn_{0.5}Fe_2O_4$ Nanomaterials**,** Int. J. Sci. Eng. and Tech. **(I-JEST)**, Special **issue Nano iron oxides and composites – recent avances in Scientific and technological aspects**, Vol.2, No.8. (2010), p. 104-109.

14. **Rakesh Kr Singh**, A. Yadav, A. Narayan, Kamal Prasad, Structural and Magnetic Studies of $Ni_{0.5}M_{0.5}Fe_2O_4$ (M = Cu and Co) Nanoparticles on annealing temperature, Int. J. Eng. Sci and Tech. **(I-JEST)**, **Special issue Nano iron oxides and composites – recent avances in Scientific and technological aspects**, Vol.2, No.8. (2010), p.73-79.

15. **Rakesh Kumar Singh,** A. Yadav, R.S.Yadav, A.C. Pandey, Structural, Magnetic and Photoluminescent Properties of Strontium Ferrite nanoparticles synthesized using Citrate precursor method, Manthan, International Journal,Vo1.8(2008),p.22-27,

16. **Rakesh Kumar Singh,** Growth, Characterization and Applications of Ferrite Nanoparticles through Bottom up approach, Manthan, International Journal, Vo1.6 (2008) p.29-31

17. **Rakesh Kumar Singh,** A. Narayan, Binay Kumar, M.K. Roy, Brajesh Pandey, **H.C. Verma,** A Study of Zinc Ferrite nanoparticles prepared using chemical route, Patna University Journal, Vol. 31 (2007),p.11-14.

18. **Rakesh Kumar Singh** and Amarendra Narayan, X-ray Diffraction-An Investigation tool for Nanomaterials, Proceeding of National Conference on Convergence with Physics, Jamshedpur (2007),p.123-127.

19. **Rakesh Kumar Singh** and Amarendra Narayan, Nickel-Zinc ferrite Nanoparticles: Synthesis and Characterization, Proceeding of National Conference on nanomaterials and Nanotechnology, Dept. of Physics, University of Lucknow, (2007), p.118-121.

20. **Rakesh Kumar Singh**, A.Yadav, A. Narayan, Girija Gupta, Amitabh Ghosh, Structural, Magnetic and Photoluminiscent behaviour of Cobalt Ferrite Nanoparticles prepared using chemical method, Proceeding of National Seminar on Applications of Nanoscience and Nanotechnology, Patna Women's College(2008)p. 22-26

21. **Rakesh Kumar Singh**, Madhu Rani Sinha and R.N.Tagore, "Magnetic Nanoparticles in Biological Sciences: a review," Accepted for publication in proceeding of international conference on recent trends in life sciences researchers VIS-A-VIS, natural resources management, sustainable Development and Human welfare- 27 June 2009, Vinoba Bhabe University, Hazaribagh,

22. **Rakesh Kumar Singh**, A.Yadav, A.Narayan, Structural and Magnetic studies of Zn substituted Cobalt ferrite nanoparticles annealed at 450^oC, Manthan, Int. Jour. Vol.11, (2010), p.31-35.

23. **Rakesh Kumar Singh**, Nishit Pandey, Amarendra Narayan. Mossbauer studies of Barium Hexa-ferrite Nanoparticles annealed at 600^oC, synthesized using Citrate precursor Method, **MSI bulletein**, (2010), p.39-41.

24. **Rakesh Kumar Singh**, A. Yadav, **A.C. Pandey**, Jyoti Shah, **R. K. Kotnala**, Structural, Magnetic and Photoluminescent Properties of Barium Hexa Ferrite nanparticles synthesized using Citrate precursor method, Proceeding, Univ. of Lucknow, (2009), p.21-24.

25 Manishi Puja, **Rakesh Kumar Singh**, Dolly Sinha, Magnetic studies of Sm substituted Ni-Ferrite nanomaterials, Patna Univ Jour. Centenary issue (2010) p.64-67

<u>Research Papers in</u>

Explore- Journal of Research for Undergraduate and Postgraduate students

Under the College with Potential for Excellence (CPE) status scheme by UGC, Govt. of India,

Scheme, **embodies the research work of my students as a co-authors.**

ISSN 2278-0297(Print), ISSN 2278-6414(online), http:patnawomenscollege.in/journal

26. **Rakesh Kumar Singh**, Rakshan Noor, Vijeta Mishra, Priya Tiwari ' Synthesis, Structural and Magnetic properties of $Ni_{0.8}M_{0.2}Fe_2O_4$ (M=Co,Cu) nanoparticles synthesized by Citrate Precursor Method, Explore, J. of Research for UG & PG students, Vol. IV, (2013) – In press.

27. Manisha Khemka, Anksha Kumari, Swati Singh, **Rakesh Kumar Singh,** Girija Gupta, Growth and Characterization of Nanosize $CaFe_20_4$ by Nitrate reaction, Explore, Vol 1.(2009)p.I-3.

28. Shanta Singh, Monica Wincet, Karuna D'Costa, Rakesh Kr Singh, Magnetic amd Mossbauer studies of low temperature crystallined small size barium hexa ferrite nanoparticles, Vol.III(2011)p.1-5

29. Manisha Kumari, Divya Sharma, Trisha Raj, **Rakesh Kr Singh**, Synthesis, Structural and Magnetic studies of Cu Substituted Cobalt Ferrite Nanomaterials annealed at 750^{o}C, Vol.IV (2012) p.7-10

30. Puja Pandey, Shilpa Kumari, Girija Gupta, **Rakesh Kumar Singh**, Synthesis, Structural and Magnetic Studies of Rare earth element Ce substituted Ba-Hexa ferrite Nanoparticles Via Citrate Precursor Method, Vol. II, (2010)p. 6-9.

31. Divya Kumari, Rasmi Thakur, Girija Gupta, **Rakesh Kumar Singh**, Synthesis, Structural and Magnetic Studies of Rare earth element La substituted Ba-Hexa ferrite Nanoparticles via Citrate Precursor Method, Explore, Vol. II, (2010) p.9-12

32. Shubhra Kumari, Farheen Hayat, Rakesh Kumar Singh, Girija Gupta, Synthesis, Structural and Magnetic Properties of Nickel substituted Cobalt Ferrite Nano Particle ($Ni_{0.03}Co_{0.97}Fe_2O_4$) via Citrate Precursor Method, Explore, Vol. II, (2010) p.13-15

33. Nisha Kumari, Sushmita Prakash, **Rakesh Kumar Singh**, Synthesis, Structural and Magnetic Studies of Nickel Substituted Cobalt Ferrite Nanomaterials ($Ni_{0.07}Co_{0.93}Fe_2O_4$) via Citrate Precursor Method, Explore, Vol. II, (2010).1-5

34. Pinki Singh, Sonam Perween, Girija Gupta, **Rakesh Kumar Singh**, Growth and Characterization of Rare earth element Ce and La substituted $SnFe_204$ Nanoparticles Via Citrate Precursor Method, Explore, Vol. II, (2010)p. 16-18

35. Sonam Parween, Neha Kumari, Puja Padey, **Rakesh Kumar Singh**, Zinc and Nickel substituted Cobalt Ferrite Nanoparticles synthesized using Citrate precursor method, annealed at 450°C, Explore, Vol. II, (2010), p. 1-3

36. Anjali Kumari, Nancy Goenka, **Rakesh Kumar Singh**, Growth, Structural and Magnetic studies of Rare earth element Ce substituted Zn Ferrite Nanoparticles via Citrate precursor method, Explore, Vol. II, (2010) p.19-22.

Research Papers in IRIS — Journal for Young Scientists.

Under the Basic Scientific Scheme (BSR) special Scheme of UGC, Govt. of India, **embodies the research work of my students as a co-authors.**

ISSN 2278-618X (Print), ISSN 2278-6384 (online), http:patnawomenscollege.in/journal

37. Arpana Kumari, Adhishree Abha, **Rakesh Kumar singh**, FTIR and Magnetic studies of Cu substituted Cobalt Ferrite Nanomaterials annealed at 650^0C**,** Vol.I, (2011)p.5-9

38. Rakesh Kumar Singh, Tarbia Jamil, Rashmi Kumari and Priya Kumari, **Synthesis** and effect of annealing temperature on structural and magnetic properties of $Ni_{0.75}Zn_{0.25}Fe_2O_4$ and $Ni_{0.25}Zn_{0.75}Fe_2O_4$ Nanopowder, annealed at temperature 550C, 650C and 700C, IRIS, J. of Young Scientist, Vol.3 (2013) – accepted.

39. Richa Sinha, Sushmita Kumari, Priya Tiwari, **Rakesh Kumar Singh,** synthesis and Study of effect of size of divalent metal on structural and Magnetic Properties of MFe_2o_4 (M=Mg, Ni, Cu and Ca) Ferrite Nanomaterials, Synthesized by Citrate approach and annealed at 450^oC. IRIS – Journal of Young Scientists (In press).

40. Vijeta Mishra, Rakhshan Noor. **Rakesh Kumar Singh**, Study the effect of Annealing temperature on Structural & Magnetic properties of $LiFe_5O_8$ (Lithium Ferrite) Nanomaterials and Synthesized by Citrate Precursor Method. IRIS – Journal of Young Scientists (In press).

Papers on Innovative teaching, Science **Education & Popularization**

41. Santosh Kumar, **Rakesh Kumar Singh,** B.C.Rai, Amarendra Narayan, Popularization of Physics through Low cost/ No cost Experiment, Manthan, International Journal, Vo1.8(2008),p.31-32,

42. Rakesh Kumar Singh, Science Education and Global Recognition, Souveneur, NCERT-SCERT, UNICEF, Jawahar Lal Children National Science & Environment Education exhibition(2011)p.67

43. **Rakesh Kumar Singh,** Lev Davidovish Landau: Nobel Laureate Scientist of Physics, Manthan, International Journal, Vo1. 7(2008) p.2-3.

44. **Rakesh Kumar Singh**, Amarendra Narayan, Creating interest in Physics Learning and Devloping Scientific Temper through low cost - no cost Demonstrations, Proceeding Natn. Conf., dept. of Education, PWC,(In press)

45. Rakesh Kumar Singh, International Year of Astronomy-2009, Manthan, Int. J. Vol.8, (2009) p.4-7

Chapters in Book:

46. **Nanotechnology**, General and Environmental studies (GES) manual, Patna Women's College, Patna University, Vol. 1 (2008), p.235-239.

47. **Different form of Radiation**, General and Environmental studies GES manual, Patna Women's College, Patna University, Vol 1 (2008). P.196-198.

Abstract Published in Explore: A Compendium of Abstracts College with potential for Excellence (CPE) Research projects; 2005-2008, (UGC-Sponsored), patnawomenscollege/journal

50. Sneha singh, **Rakesh Kr Singh,** Girija Gupta, Study of colour Radiation and photosynthesis (2004).p.01

51. Ajita Ojha, **Rakesh Kr Singh,** Girija Gupta,Preparation of Low cost Electronic Intercom (2005)p.02

52. Ankita Srivastava, Sweta Shivani, Richa Priya, **Rakesh Kr Singh,** Girija Gupta, Synthesis and Characterization of Mn-Zn ferrite nanoparticles.(2006)p.06

53. Monika Srivastava, Ritika, Kumari Sweta, **Rakesh Kr Singh,** Girija Gupta, Science and Technology of Nanomaterials: A Basic study, (2007) p.08.

Total research publication is about 90 in last 15 year

Detail of Doctoral Research (Ph.D.) Guided and Awarded

S.No	Research Scholar	Title of Doctoral Research
1	Mr Sanjay Kumar	Synthesis Characterization and Applications of some Ayurvedic bhasma as Nanomedicine"
2	Mr Abhay kumar Aman	Synthesis, Characterization of Nano size food materials and its applications".

Doctoral Research (Ph.D.) Registered for Guidance

S. No.	Name	Guide/ Supervisor	Thrust area of Research
1.	Harendra Satyapal	Dr. Rakesh Kr. Singh	Magnetic Nanomaterials
2	Sweta Sinha	Dr. Rakesh Kr Singh	Ayurvedic Bhasma as a Nanomedicine
3	Archana Kumari	Dr. Rakesh Kr Singh	Food Nanomaterials
4	Mr. B.Bikramaditya	Dr. Rakesh Kr Singh	Nano electronics
5	Dr. Prabhat Kr Dwedi	Dr. Rakesh Kr Singh	Ayurvedic Bhasma as Nanomedicine
6	Md. Qamar Tanbir	Dr. Rakesh Kr Singh	Magnetic Nanomaterials

M. Tech Research Project submitted/ awarded Degree/ Guided

Sl.	Name of the Scholar	Research Project Topic
1.	Akanksha Kumari	Synthesis and characterization of Nano silica from Rice husk.
2	Kumar Shivam	Preparation of Nickel and Cobalt Ferrite Nanoparticle at different annealing temperature and Evaluation of their Structural, Electrical and Magnetic properties.
3.	Neelam Prabha	Synthesis of some Rare earth substituted ferrite Nano materials and investigation of their Electrical and Magnetic properties.
4	Abhishekh Ranjan	Preparation of Nanosilica from Rice husk by different chemical methods and characterization by Modern scientific tools.
5	Atuljyoti	Synthesis of Nano silica from Rice husk and preparation of their composite.
6	Shubhra	Synthesis and characterization of Gadolium substituted Cobalt and Nickel Ferrite Nanomaterials.
7	Nishant	Synthesis, Characterization of some alkali metal substituted Ferrite Nanomaterials and its correlation between properties and Applications
8	Amit kr	Synthesis and Characterization of Some Garnet nanomaterials.
9	Sampurnand	Synthesis and Characterization of Nickel Alumunate and Zinc Alumuntate at diferent annealing Temperature.
10	Saurav Kr Sharma	Synthesis and Characterization of Magnetium ferrite Nanoparticles.
11	Md. Qamar Tanvir	Synthesis and Characterization of Cr substituted Cobalt Ferrite nanomaterials.

M.Tech Research Project Registered and working (2017-2019 session)

S.No	Name	Research Area
1	Monalisha	Nano Electronics(Magnetic materials)
2	Archana Kumari	Nano Silica from Rice husk(Agriculture Waste)
3	Farhan Khan	Nanofertilizer
4.	Raj Aryan	Magnetic Materials(Nano-Electronics)
5.	Rakesh Ranjan	Food Nanomaterials
6.	Ayush Kumar Jha	Nanofertilizer
7.	Abhishekh Kr	Magnetic Materials (Nano-Electronics)
8	Anurag Kumar	Nano-Silica from Rice husk
9	Zeeshan Hasmi	Hexa Ferrite Nanomaterials
10	Ashutosh Kumar	Water filteration through Nanomaterials

Recent Awards/ Recognitions

1. International level Research Presentations/activities and AKU faculty felicitated

Dr. Rakesh Kumar Singh presented a paper on "Study of Ayurvedic Nanocrystalline*Tamra* and *Shankh* Bhasma physical Characteristics by Employing Modern Scientific tools and Applications" in European Advanced Materials Congress (EAMC)-2016, organized by International Association of Advanced Materials, Linkoping University Sweden, Govt. of Sweden, during 23-25 August 2016 at Stockholm, Sweden. Presented work was highly appreciated and chairperson of the International conference felicitate to Dr. Rakesh kr Singh.

Honored by Executive Chairs of European Advanced Material Congress-2016, at Sweden: Prof. Hisatosi Kobayashi (Left), National Institute for Material Science, Tsukuba, Japan

2. Nominated Executive Council (EC) member of Society for Scientific Council, Delhi

The 21st General Body Member of **Society for Scientific Values (SSV), Delhi** meeting was held on Jan 29, 2015, at **National Physical laboratory (NPL) Delhi**. In this meeting new Executive **Council (EC) members elected for the period 2015-18**. The nomination of **Dr. Rakesh Kumar Singh, Aryabhatta center for nanoscience and nanotechnology, Aryabhatta Knowledge University, Patna** was considered and approved as **new Executive council members by the President of SSV, Prof. K.L.Chopara, former Director, and IIT Kharagpur.** SSV, a unique International level voluntary Society, was set up by some prominent scientists of the country during 1987.The Society nurtures ethical values among scientists, academicians and engineers through national, International and institutional interactive seminars. As a EC member I have delivered lectures at various places among youth on the topic nurturing ethics among students.

In addition to mentioned above following academic associations as Life Membership / Linkage of Learned Societies/ Collaborators

Dr. Rakesh Kr Singh is a member of various Scientific / Professional Societies

1. Society for Scientific values, Delhi (Executive Member), Coordinated by- Prof. K.L.Chopra, Ex- Director, IIT Kharagpur

Objective: To promote objectivity, Integrality and Ethical values in all pursuits of Scientific research, Education and management

2. National Anveshika Network of India (Jt. Coordinator) and Utsahi Physics Teacher Group (National coordinator-Prof. H.C.Verma, IIT Kanpur)

A group of teachers that advocates for experiment-assisted teaching and trained by Prof. H.C.Verma, Dept. of Physics, IIT Kanpur(www.utsahiphysicsteachers.com)

In addition to these Dr. Rakesh associated with , Science for Society Bihar, Member-NCSTC network, New Delhi (State level organization for producing Science & Technology Communication) Coordinated by Prof. S.P.Verma, former chairman- National Council of Science & Technology Communication –network, Delhi, **The Art of Living foundation, India(** Spiritual organization of international level for Peace, Harmony, foster ethical values and spiritual growth), **Magnetic Society of India (MSI), Hyderabad-** National

organization to promote , encourage &Development the growth of Magnetic materials, Components and Devices, Bihar Brain Development Society(Spokes-person.

In addition to above, I have been working as research group member with Dr. R.K.kotnala, Chief Scientist-CSIR-NPL-Delhi, Prof. Avinash C Pandey- Director- Institute of Interdisciplinary center, University of Allahabad, Dr. Manoranjan Kar-IIT Patna, Prof. A.K.Ghosh, A.N.Collge, Patna, Dr. Chandan Upadhyay, BHU-IIT, Prof. R.K.Verma(Vice Chancellor), Vice- President, International Confederation of Thermal Analysis and calorimetry

Talk delivered in National Seminar

Addressing in Parent-Teacher meet

Teaching Through Experiment

Addressing Teachers on Science Education

Detail of Guided Research and Development Projects: UGC Sponsored under CPE and NAAC- 'A' Grade Scheme of UGC-India

Following Projects at UG level were conducted as a supervisor under Basic Scientific Research (BSR) of NAAC –'A' Grade and College with Potential for Excellence(CPE)* status Scheme of UGC, Govt. Of India, at Patna Women's College, Patna University

S.No	Title of the Project	Year of Completation	Co-Guide if any	Name of the Scholar
1.	Synthesis and Study the effect of Annealing temperature on Structural & Magnetic properties of $LiFe_5O_8$ (Lithium Ferrite) Nanomaterials	2011 **Basic Scientific Research**	-	Vijeta Mishra and Rakhshan Noor
2.	Synthesis and Study of effect of size of divalent metal on structural and Magnetic Properties of MFe_2O_4.	2011 **Basic Scientific Research**	-	Richa Sinha S. Kumari, Priya Tiwari
3.	Synthesis, Structural and Magnetic studies of Cu Substituted Cobalt Ferrite Nanomaterials annealed at 750^oC.	**2011 CPE***		Manisha Kumari , Divya Sharma, Trisha Raj,
4.	Low temperature synthesis of Ba-hexa ferrite Nanomaterials using Citrate Precursor Method	2010 **CPE***	-	M.Wincet,K. D'Costa,Shanta Singh
5.	Structural and Magnetic study of Cu-substituted Cobalt ferrite Nanoparticles annealed at 650^0C.	2010 **Basic Scientific Research**	-	Adhishree Abha andArpana kumara
6.	Magnetic properties of Zn and Ni substituted Cobalt Ferrite Nanomaterials	2009 **CPE***	-	Sonam Perveen and Puja Pandey
7.	,Growth , Structural and Magnetic studies of **Rare earth** element Ce substituted Zn Ferrite Nanoparticles	2009 **Basic Scientific Research**	-	Anjali Kumari, Nancy Goenka,
8.	Synthesis, structural & Magnetic studies Ni substituted cobalt Ferrite nanomaterials using Citrate Precursor Method.	2009 **Basic Scientific Research**	-	Shubhra Kumari Farheen Hayat,
9.	Synthesis, structural & Magnetic studies Rare earth elements La and Ce substituted Sn Ferrite nanomaterials.	2009 **Basic Scientific Research**	-	Pinkey singh, Sonam Perween
10	Growth and Characterization of Nanosize $CaFe_2O_4$ by Nitrate reaction	2008 **CPE***	Prof. Giraja Gupta	M.Khemka, A Kumari,Swati Singh

	Continued on next page			
11	Science and Technology of Nanomaterials: A Basic study	2007 **CPE***	Prof. Girija Gupta	M.Srivastava, K. sweta and Ritika
12	Synthesis and Characterization of Mn-Zn ferrite nanomaterials	2006 **CPE***	Prof. G. Gupta	A..Shivani and R. Priya
13	Preparation of Low cost electronic Intercom	2005 **CPE***	Prof. G. Gupta	Ajita Ojha et al
14	Study of colour radiation and Photosynthesis	2004 **CPE***	Prof. G Gupta	Sneha Singh et al.
15	Synthesis and effect of annealing temperature on structural and Magnetic study of Ni-Co/Cu ferrite nanoparicles	2012 **CPE**	-	Vijeta Mishra, Rakshan Noor and Priya Tiwari
16	Synthesis and effect of annealing temperature on structural and Magnetic study of Ni-Zn ferrite nanoparicles	2012 **Basic Scientific Research**	-	Tarbia Jamil, Rashmi Kumari and Priya Kumari

College with Potential for excellence (CPE) and **NAAC 'A' Grade,**
Research projects at **Patna Women's College,** Patna University- General Detail

Patna women's College, Patna University is **'A' Grade institution with a cumulative Grade point average (CGPA) of 3.51 out of 4 and also College with potential for excellence status (CPE) status accorded by UGC**. Under these status UGC has given special grant for inculcate scientific research temper among Science graduate students. Under **Basic Scientific Research** (BSR) and College **with potential for excellence status (**CPE) status scheme group of students (2 to 3 in a group) undertake research project in a specific area or topic under the supervision of a teacher in the department. The students collects data/materials, organize these and after analysis and inference, present their finding in the form of a written report under the supervision of teacher in the Dept. Subsequently they modify the content of their research and finding in the form of a research paper and a PPT presentation. A panel of judges evaluate the quality of research and the best presentations will be review by advisory committee and finally recommended their article for publishing in **'Explore'journal, ww.w.patnawomenscollege/explore and patnawomenscollege.in/IRIS, peer reviewed journal**

Impact Assessment of CPE and BSR projects of UGC-special scheme and Growth in higher education

It was my observation during research work carried out by UG students under the supervision of a teacher at UG level, new properties, new Science and new applications changed the temperament of the students towards learning/ creating knowledge. I remember few of the students, who were under my supervision and worked only for receiving certificate, later changed their outlook towards scientific research and learning and now they are working in Premier instituations of national repute. Most of the scholars of UG level go in for higher studies before they opt for any Job or placement. I have supervised total 16 UGC sponsored Research projects from Year 2004 to 2011 under CPE(College with potential for excellence accorded by UGC) Scheme and Basic Scientific Research.

Awards/ Recognitions/ Honours/ Distinctions

1. Recognition of **Senior Resource Person** of Utsahi Physics Teachers/Anveshika coordinator, Coordinated by By Prof. H. C. Verma, Dept. of Physics, IIT Kanpur(www.hcverma.in) in 2009.

2. Selected **by DST, Govt of India,** in an **International Interactive meet of** Noble Laureates and Science Icons of Germany, Europe and India, on the topic **"Motivation of Youth in Science and technology" On the Occasion of India- European Union Ministerial level Science Conference, Organized by:- DST, Govt of India, Host:- Deptt. of Science and Technology,** Embassy of Germany in New Delhi, European Union(EU) delegation of EC in India**.Time-1000-1730hrs; Date- 8th Feb 2007.**

3. *The Master Resource Person (MRP)* ***of*** *International Year of Physics(IYP)-2005 Proclaimed by United Nation.* ***The training programme was held at Institute of Physics*** *Bhubaneswar* ***and Organized by*** *DST, Govt. Of India.* ***I was nominated as a The Master Resource Person (MRP) by BCST-DST, Govt. of Bihar and Science for Society- NCSTC network, Delhi***

4. **The Master Resource Person(MRP)** of **International Year of Astronomy(IYA)-2009**, proclaimed by **United Nations of its 62 general assembly**. **Training programe was held at** Gurunanak Dev University **Amritsar**, and Organized by **DST, Govt. Of India.** I was nominated as a The Master Resource Person (MRP) by BCST-DST, Govt. of Bihar and Science for Society- NCSTC network, Delhi.

5. Young Scientist award: In 1st Global Bihar Science Conference (7- 9 May 2008, held at

Patna Science College, Patna University) by Screening committee of Global Scientific council of B.Brain Devlopment Society, An International forum of Scientists, Academicians, Technocrates, Industrialists of Bihar origin.

6. One of the Expert in National workshop to "produce a module on Appreciating Physics in everyday life and Physics for Consumer" at Guwahati, **Date –13-15 June 2006, Organized by- NCSTC-DST Govt of India and DST,** Govt of Assam**.**

7. Appointed as a **Coordinator** in a prgramme – "**Vigyan ke teen sopan**" **Khoj, Sodh Aur Bodh**, **Indo-German Initiative**, A Countrywide Programme on Research and Devlpment popularization built around an exhibition train – **Science express** (A journey in to the future of Scientific discovery) at Patna. This Science express train was developed by **German Plank Society, Govt. of Germany** and DST, Govt. of India., Organized by :- NCSTC-DST, Govt. of India, Science For Society Bihar. Date:-26-29 December 2007. The main purpose of this train is to create awareness about Science education & Research among general public and academiciains/ students. On this occasion I have visited various higher education institutes(one month compaigning) in Patna for visiting this Science Express train and organized career orientation session in R&D, and Guest lecture on cutting edge research at Patna Railway station for 3 days. **Nearly more than 1 lakh people visited this Science express train and explored their ideas about how science education helf in shaping the society**

Invited Talk Delivered/ Research Presenations

Dr. Rakesh Kr Singh, delived more than 50 Invited talk/ Research presentations in various International/ National/ State conferences/ workshops/ seminars at Stockholm-Sweden, IIT Kanpur, J.P.Univrsity Chapra, Vivekanand Global University Jaipur, IIT Patna,Patna university, Patliputra University Patna, T.N.B College Bhagalpur, Bhagalpur university, NPL-CSIR, Delhi, L.S.College, Bihar University Muzaffarpur, NIT Patna, BIT-Meshra(Patna Unit) Inspire camp of DST, Govt. of India in 5^{th} -6^{th}Global Bihar Science Conference, Mata BaisnoDevei University, J &K, Inspire camp of DST-Govt. of India, Rashtriya Aviskar Abhiyan Activities & Unnat Bharat Abhiyan Activities- An initiative of MHRD, Govt. of Inida, Teachers workshops in various Schools, Colleges and Universities etc. In this process, good scientific relation established that help in overall academic programme.

RashtriyaAvishkar Abhiyan&Unnat Bharat Abhiyan activity:

In pursuance of the focus on connecting innovative knowledge to life outside the class room and making learning of Science Mathematics a joyful and meaningful activity, to bring focus on innovation and use of technology, the **Ministry of Human Resource Development, Govt. of India has set up the Rashtriya Avishkar Abhiyan (RAA) - a convergent framework to encouraged and supported to heights of academic excellence and research. While the Unnat Bharat Abhiyan —** a scheme of the Centre aimed at making higher education institutions provide solutions for problems of villages and much wider participation from many higher educational institutions. In these programme, Dr. Rakesh Kr Singh delivered a Lecture as an expert/resource person at Varanasi, IIT Patna. Conducted 4 workshops as a local coordinator of Rashtriya Aviskar Abhiyan Activity for teachers and students at Indian Institute of Technology (IIT) Patna in April 2017, September 2017, July 2018 and Aug. 2018. Such programme motivate young people for science for shaping society.

Professional Development, Co-Curricular and Extension Activities

Dr. Rakesh Kumar Singh, conducted more than 60 Students related/ professional development activities as a Coordinator such as - Coordinator National Anveshika Experimental Skill Test (**NAEST)-2017**organized for Colleges, Universities and Schools students. This is unique programme for skill development in science experiment for inspired research. Prof.H.C.Verma, IIT Kanpur is National coordinator of NAEST; Participated as a Resource person in State level Balsri programme -2010- 2017 on focal theme, Creative Scientific Innovations, Organized by Dept. of Kilkari, Autonomous unit of Dept. of Education, Govt. of Bihar; Particiapated as Stackholder meeting on International research project FAR-Ganga in collaboartyion with University of Manchester and University of Salford, UK at Bihar pollution control board, Patna dated 17th Feb. 2018;. Valued guidance as resource person for the enrichment of national project(A programme of DST-Govt. of India) for state awardee, at SCERT, Govt. of Bihar, Patna, from year 2005-2018; Particiaption as a stachholder Interaction meeting with Hon'ble minister, MHRD, Govt. of India and UGC chairman on theme- Shodh, Shikha and samikha, at Pune, dated 5th Sep. 2017, Delivered a lecture as a Master Resource person of International Year of Light, International year of Physics & Astronomy-Proclaimed by United nation in Schools, Colleges, Universities on focal theme- Image of science & Scientist for shaping society; Coordinator of National Graduate Physics Examination(NGPE)-A Gradute level Science Exama from year 2006 to 2017.

Contribution to Corporate Life and Management of the Department and Institution through participation in academic and Administrative Committees and responsibilities. Engaged in activities as a Various Committee member and their progress:

Head of the Aryabhattacenter for Nanoscience and Technology/ Professor-incharge-Establishment/Acadamic Aryabhatta Knowledge University, Patna from 1st April 2014; Nodal officer of NPTEL(National Programme on Technology Enhanced Learning) workshop of Aryabhatta Knowledge University at IIT Patna, organized by IIT Madras; Convener Doctoral Committee, Post-Graduate Programme in Research ,Aryabhattacenter for Nanoscience and Nanotechnology, AKU from 21st July 2017; Member of welfare Committee of AKU, Admission &Examination session for 2017-2019 Session- Committee member; RUSA related preparation work at University level-Organizing Committee member, Library Committee member of AKU; Academic Council Member and PGRC, School of Engineering & Technology, AKU, Committee member for preparation of academic calender-2018 of AKU, Post-creation, Absorption and Confirmation committee; Research Advisory Committee member-IQAC-Patna University; Organizing committee member/ Convener/ Organizing secretary/ coordinator of more than 50 various International/National Conferences or seminars, Center superintendent of various competitive and university examination; Committee member of UGC ordinance for Ph.D. degree of AKU

INNOVATIVE PRACTICES FOR GROWTH IN HIGHER EDUCATION AND RESEARCH

RESEARCH DRIVEN LEARNING- TEACHING THROUGH LOW COST EXPERIMENT AND ADVOCATING **NATURAL PROCESS OF LEARNING FOR INNOVATION (AT ALL LEVELS OF STUDY)- Initiative of Prof. H.C.Verma, IIT Kanpur**


Dr. Rakesh Kr Singh, head of the Nanoscience center developed about 200 low cost science experiment, under the supervision of eminent academician Prof. H.C.Verma, IIT Kanpur and demonstrated these experiment under various situations including classrooms/ conferences, public lecture.

As an impact, they observed that such low cost teaching through experiment is very effective tools for concept building and interest generation in basic science and scientific

research. We have conducted more than 50 workshops with such low cost experiments, including in **Rashtriya Aviskar Abhiyan programme & Unnat Bharat Abhiyan -Initiative of Govt. of India/ Teachers & Students workshop**. This is an Initiative of National Anveshika Network of India, coordinated by Prof. H.C.Verma, IIT Kanpur.

Impact assessment- In last 10 years, we have conducted more than 65 workshops with the help of such experiments. These workshops have attracted attention of students and encouraged them to ask relevant questions in science at all levels of study. Such efforts have also helped in demystifying scientific research and developing scientific thinking in students/ faculty members. The present Government has taken several steps for developing research within the country in frontline areas such as Nanotechnology, Biotechnology and Information technology. Such innovative practices supplement this move by helping create interest in basic understanding in science without which cutting edge research is not at all possible.

References

1. Prof. H.C.Verma, Dept. of Physics, IIT Kanpur
2. Prof. Asheshwar Yadav, Former Vice Chancellor, B.R.B.U
3. Prof. R.K.Verma, Vice Chancellor, Munger University
4. Prof. S.P.Verma, former University Prof & Head, Dept. of Physics, Science College, Patna University(Former chairman-national council of science & Technology communication network-DST-Govt. of India, Delhi)
5. Dr. R.K.Kotnala, Chief Scientist, National Physical Laboratory(NPL) Delhi
6. Prof. Dolly Sinha, Pro Vice Chancellor, Patna University
7. Prof. K.L.Chopra, for Director, IIT Kharagpur
8. Dr. Manoranjan kar, Director(I/C), IIT Patna
9. Prof. S.N.Guha, founder Vice Chancellor, Aryabhatta Knowledge University, Patna
10. Dr.(Sister) Doris D' Souza, former Principal, Patna Women's College, Patna University
11. Prof. Avinash C. Pandey, Director, Inter University accelerator Center, UGC, Delhi
12. Prof. Rajmani Prasad Sinha, former Vice Chancellor and higher education council member, Govt. of Bihar.
13. Prof. Ranjan Kumar Singh, BHU

Few Activities of Nation wide Science Movement

सोमवार, 09 जुलाई 2012, पटना

क 159, पेज 12, मेट्रो संस्करण

www.livehindustan.com

₹1/-

कानपुर आईआईटी में बिहार के प्रो.एचसी वर्मा व उनकी टीम का इनोवेशन ला रहा रंग, बिहार के स्कूलों की बदली तस्वीर

देश के कोने-कोने में साइंटिफिक फीवर

◉ पटना | अजय शंकर

खगड़िया के अलौली ब्लॉक का हाईस्कूल। यहां साइंस की पढ़ाई तो होती है पर प्रैक्टिकल के लिए लैब नहीं है। छात्र सिर्फ थ्योरी पढ़ते हैं। लेकिन, इन दिनों यहां प्रैक्टिकल भी हो रहा है। वह भी बिना लैब और ऑपरेट्स के। महज दो कागज के टुकड़ों के जरिए बरनौली का थ्योरम समझाया जा रहा है।

यह हाल केवल इस स्कूल का ही नहीं है, बल्कि पूरे बिहार और देश के कई स्कूलों का भी है। ऐसा संभव हो पा रहा है आईआईटी कानपुर में बिहार के प्रो. एचसी वर्मा और उनके साथियों के इनोवेटिव प्रयोग की वजह से। उन्होंने 'उत्साही फिजिक्स टीचिंग ग्रुप' नाम से एक टीम बनाई है। यह टीम देश के कोने-कोने में छात्रों और शिक्षकों में साइंटिफिक फीवर डेवलप करने में जुटी है। इससे बिहार के स्कूलों में बदलाव आ रहा है। जो शिक्षक साइंस फिजिक्स पढ़ाने में रुचि नहीं लेते थे, आज वही विभिन्न प्रयोगों के जरिए छात्रों को पढ़ा रहे हैं। छात्र भी पढ़ाई भी ध्यान देने लगे हैं। 'उत्साही फिजिक्स टीचिंग ग्रुप' के सीनियर मेंबर डॉ. राकेश कुमार सिंह इन दिनों गांवों में कैंप कर खुद के द्वारा तैयार उपकरणों के जरिए शिक्षकों को फिजिक्स पढ़ाने के तरीके बता रहे हैं।

इनमें लेजर मशीन, बरनौली थ्योरम, मोमेंट ऑफ इनर्सिया, वेब, मोशन, सीबैक इफेक्ट व फिजिक्स के अन्य पहलू शामिल हैं। इस टीम के इस इनोवेशन के जरिए कॉलेज में प्रयोगशाला में भारी भरकम मशीन के बिना भी छोटे व सस्ते उपकरण से भी छात्रों को साइंस का प्रयोग दिखाया जा सकता है। इससे छात्रों व शिक्षकों में साइंस के प्रति रुचि जागृत होगी। इससे बिहार में भी प्योर साइंस डेवलप होगा व युवा वैज्ञानिक की तादाद में बढ़ोतरी होगी। इन युवा वैज्ञानिकों की मदद से भविष्य में बिहार एवं देश में मॉडर्न टेक्नोलॉजी का तीव्र विकास संभव हो सकेगा।

हो रहा है बदलाव

इस मिशन से बिहार के गांवों में मौजूद स्कूलों में काफी बदलाव आया है। जिन स्कूलों में कल तक लैब नहीं थी, आज वहां है। गांव के शिक्षक भी अपने स्तर ने नए-नए प्रयोग कर छात्रों को आसानी से चैप्टर समझा रहे हैं। छात्रों की नीरसता भी दूर हो रही है।

5000 शिक्षकों का बन चुका है कारवां

2004 में प्रो. एचसी वर्मा ने नेशनल लेवल पर फिजिक्स के 15 रिसोर्स पर्सन की मदद से 'उत्साही फिजिक्स टीचिंग ग्रुप' का गठन किया। इसमें बिहार के दो प्रोफेसर डॉ. अमरेंद्र नारायण एवं डॉ. राकेश कुमार सिंह शामिल हैं। आठ साल में ग्रुप ने देश के 5000 शिक्षकों को इनोवेटिव शिक्षा की ट्रेनिंग दी है। इनमें 500 शिक्षक बिहार के हैं।

सिटी लाइफ

prabhatkhabar.com

लाइफ पटना

www.prabhatkhabar.com

25.05.2016

13

स्वीडन में नैनोमेडिसिन पर प्रेजेंटेशन देंगे डॉ राकेश

■ एकेयू में फैकल्टी डॉक्टर राकेश के साथ दुनिया भर से मेटेरियल साइंस व नैनोटेक्नोलॉजी के एक्सपर्ट्स ले रहे हिस्सा

लाइफ रिपोर्टर @ पटना

आर्यभट नॉलेज यूनिवर्सिटी के सहायक प्रोफेसर सह नैनो साइंस सेंटर के स्थापना पदाधिकारी डॉक्टर राकेश कुमार सिंह 23 से 25 अगस्त तक स्वीडन के स्टॉकहोम में आयोजित होने वाले इंटरनेशनल कॉन्फ्रेंस ऑफ मेटेरियल साइंस, यूरोपियन एडवांस्ड मेटेरियल कांग्रेस में अपने पेपर का प्रेजेंटेशन देंगे. डॉक्टर राकेश इस आयोजन में आयुर्वेद भस्म एंड नैनोमेडिसिन विषय पर अपने रिसर्च पेपर को प्रस्तुत करेंगे. इस आयोजन में दुनिया भर से मेटेरियल साइंस व नैनोटेक्नोलॉजी के एक्सपर्ट्स हिस्सा ले रहे हैं.

डॉक्टर सिंह ने बताया कि उनके रिसर्च में मॉडर्न साइंटिफिक टूल्स द्वारा यह साबित किया गया है कि भस्म एक नैनो मेडिसिन है. यह प्राचीन भारतीय विरासत है और इस बारे में धीरे-धीरे जानकारी बाहर आ रही है. इस रिसर्च पेपर में डॉक्टर राकेश के अलावा पीएचडी स्टूडेंट अभय कुमार व संजय कुमार के साथ विवि के प्रो-वीसी एसएम करीम और कोलेबरेटर आइआइटी पटना के डॉक्टर मनोरंजन भी साथ हैं. प्रेजेंटेशन की तैयारी पूरी हो गयी है.

नैनोसाइंस लैब में हुआ है तैयार

विवि के लिए यह बड़ी बात है. हमारे पास न केवल बिहार बल्कि पूर्वोत्तर भारत में उन्नत इक्विपमेंट हैं. हमारी पूरी कोशिश है कि विवि में आधुनिक तरीके से काम हो.

प्रोफेसर एसएम करीम, प्रो-वीसी, एकेयू

नैनोसाइंस लैब में हुआ है तैयार

श्री सिंह ने बताया कि हमारा भस्म नैनोमेडिसिन के रूप में है और इसकी खासियत यह है कि छोटे स्तर पर जाकर यह इलाज करने में सक्षम है. भस्म के विभिन्न गुण जैसे रंग, गुण, गंध को विवि के नैनो साइंस लैब में तैयार किया गया है. इस कार्य में डॉक्टर मनोरंजन कर का भी सहयोग रहा है. भस्म की पूरी प्रक्रिया को बनाने, कैरेक्टराइज करने व उसके विश्लेषण करने में करीब छह माह का समय लगा है.


Advance Equipment at Aryabhatta centre for Nanoscience & Nanotechnology, AKU Patna
SEM (U.K)
XRD (Germany)
AFM (Ireland)
Nano Analyser (USA)
FTIR (U.K)
DSC/TGA (Germany)
VSM (USA)
Nanoparticle Tracker
Dilatometer (Germany)
PL (U.K)
UV-VIS-NIR (U.K)
Impedance Analyser (USA)
Micro Twin Screw Extruder (Germany)
Micro-Injection Moulding (Germany)
Reftractometer (Switzerland)
pH and Conductivity meter (Switzerland)
Balance (Switzerland) (Switzerland)
Densitometer (Switzerland)
Ball Milling (Germany)
Furnace (Germany)
Microwave (Italy)
Multiferroic System (USA)

Ethics in Science & Technology Activities (Innovative Practices)

To promote objectivity, integrity, ethical values in all pursuits of scientific research, education discourage the unethical acts in these areas and encourage scientific temper among masses

National Symposium Inaugural Dignitaries: **Prof. K.Chopra**, Former Director-I.I.TKharagpur, **Dr. R.K.Kotnala,** Chief Scientist, NPL-Delhi, **Prof. A.K.Bhowmick**, Director-I.I.TPatna, **Prof, S.Lal,** ViceChancellor, Patna University, **Dr. Sister.Doris D'Souza**, Principal, Patna Women's College(PWC), Patna University**, Prof. Janak Pandey**, V.C, Central University. of Bihar, **Dr. Rakesh Kr Singh, Asst. Prof. of Physics, Patna Women's College(Organizing Secretary),** Dr. S.Prasad, Head, Physics, PWC.

Delivered a talk as Resource personat IIT Kanpur in Teachers workshop and in National Conference

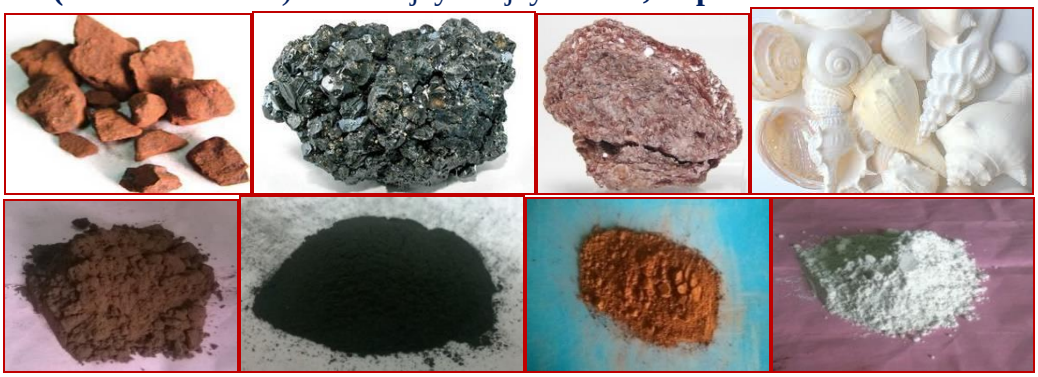
Addressing On Role of Science& Scientists For developed society,Potential Organized- Dept. of Education, Govt. of Bihar

Basic Scientific Research (BSR) and College with for Excellence Research- UGC scheme- Guidance

Doctoral Research (Ph.D.) and M.Tech-Research Project Guided by Dr. Rakesh Kumar Singh (Asst. Professor & Head, ACNN, AKU)

"Synthesis, characterisation and Applications of some Ayurvedic bhasma as Nanomedicine"

Scholar (1st Ph.D. of AKU): Mr. Sanjay Sanjay Kumar**; Supervisor**- Dr. Rakesh Kr. Singh

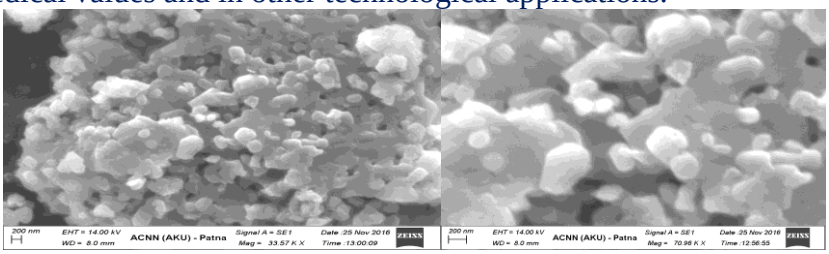


Lauha Bhasma Tamra Bhasm Abhrakh Bhasma Shankh Bhasma

Explored the Ancient Indian wisdom

Hilghlights

- All prepared bhasma shows nanocrystalline materials using using Modern scientific tools, available at Nanoscience center at AKU.
- Various bio medical testing results shows that- be useful to control the bacterial infection disease, better action of nanomedicine at cellular level and others
- Present study, scientific data obtained and scientific evidence would support in utilizing the ancient Indian wisdom of Ayuveda 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 and other technological applications viz. Electronics, MRI agents.
- It is very interesting that Lauh, Tamra, Abhrakh shows superparamagnetic property that support medical values and in other technological applications.



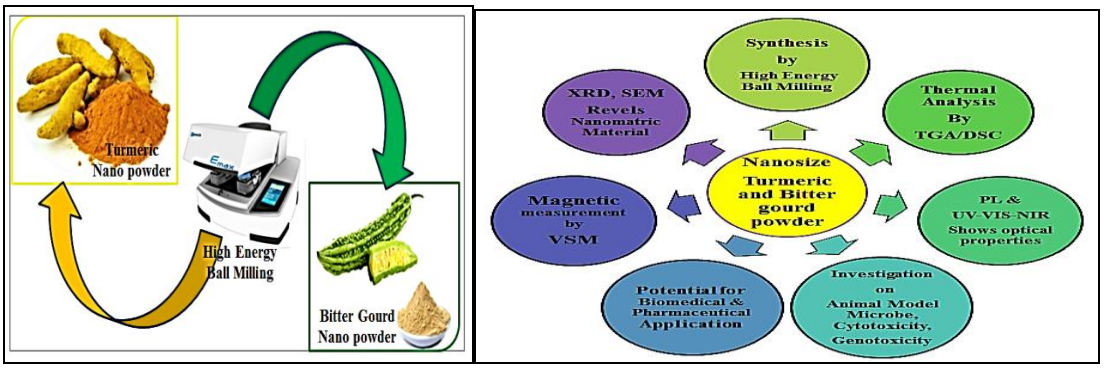
Scanning Electron Microscope micrographs of *Abhrakh bhasma* in different magnifications- observed that the microstructure is uniform which must in contest is as concern for the disease treatment i.e the action of medicine should be uniform for better action.

Note- Ms. Sweta Sinha (Ph.D. Scholar) working on calcium based Ayurvedic bhasma as a nanomedicine and Dr. Prabhat Kr Dwedi, Associate Professor, Govt. Ayurvedic College working Doctoral Research on Iron based bhasma as Nanomedicine. The first Ph.D. thesis of AKU was submitted in Arurvedic Bhasma as a Nanomedicine. We have published 6 papers in peer reviewd journals and are in planning for evidence based nanomedicine product.

Research Activities Nanotechnology in Food- Finding Highlights "Synthesis, characterization of Nanosized food materials and its Applications"

Mr.Abhay Kumar Aman(2nd Ph.D. of AKU);Supervisor- Dr. Rakesh Kr. Singh

Highlights



- Nano metric size turmeric powder and bitter gourd powder were successfully prepared by high energy ball milling equipment. SEM results showed changes and distortion in original structure. Therefore, changed in physico-chemical behavior may be useful for pharmaceutical industry as new functional food production and some other industrial use.

- Luminescence properties of turmeric and bitter gourd powder were measured by PL in visible range and may be demonstrated as luminescent source for distribution of drug at in biological system at atomic and molecular level cell or nanoscale system for monitoring and targeted drug delivery.

- From this approach, eco-friendly, faster ways large superfine powder can be produced for different uses. Magnetization values were found in both the turmeric and bitter gourd powder and this supports their use in medicine industry. Geno cytotoxicity study of curcuminresults revealed the turmeric nanopowder affect the mitotic index, Meta and Anaphase stage. While antimicrobial and MTT study showed that it depends on concentration of turmeric powder and long hours milling is not suitable for the treatment of arsenic induced hepatotoxicity. Bitter gourd doesn't show antibiotic properties, either bacteriostatic or bactericidal, when tested against Gram positive and Gram negative bacteria. It is observed that turmeric and bitter gourd are effective on cancer line (Hek293T) cells. **Ms. Archana(Ph.D. scholar) also working on Flex seed, Amla, Ginger Nanopowder for various applications. We have published 4 papers in peer reviewd journals.**

Research Activities Nanotechnology in Agriculture - Finding Highlights

Research Project Field- Nano-silica from Rice husk

AkanshaKumari, Abhishekh.Kumar, AtulJyoti of M.Tech-Nanoscienceworking**under the supervision of Dr. Rakesh Kr Singh** on synthesis of nanosilica from Rice husk for different applications in rubber industry, cement, biomedical science etc. This may be thrust area of research for the development of Bihar. Electron microscope images of nanosilica from Rice husk, obtained from Lab, AKU. They have synthesized different nanoscale amorphous and crystalline Nano-silica from agriculture waste rice husk and studies their structural, optical and Magnetic behavior.Present study shows that possibility of setup Agro based industry for various applications such as in Lithium ion Battery, drug delivery system, rubber industry etc.

Big Plan for converting Agriculture Waste in to Wealth and Knowledge.

Research activities- Nanotechnology in Electronics (Magnetic Nanomaterials)

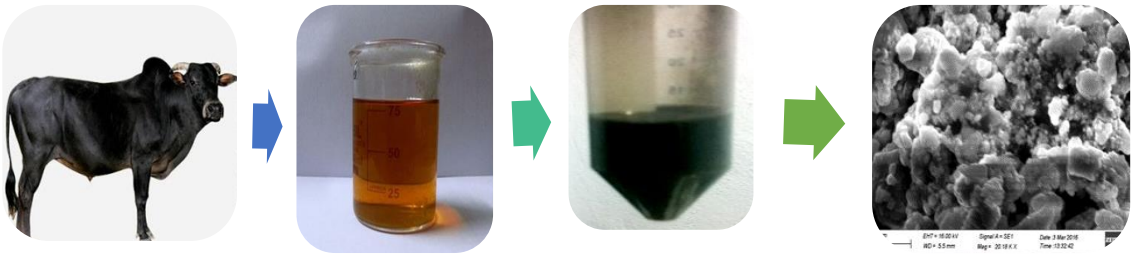
It has been estimated that in the world market that 40% of the total magnetic materials is dominated by Ferrite. Dr. Rakesh Kr Singh, Head of the center together with 1Ph.D(Mr. HarendraSatyapal) and 6 M. Tech Scholar worked on this material(Qamar Tanvir, Saurbh Sharma, Shubhra kumara, Kumar Shivam, NeelamPrabha, Sampurnand). Recently total no. of 10 paper published in peer reviewed Journal. Possible applications of this materials are in Electronics industry, Purification of water, biomedical imaging, humidity sensor, etc.One Minor research project of UGC was received by Dr. Rakesh and already submitted in this area.

Prepared Materials at Nanoscience lab and are in useful in production of magnets, electronics equipments etc.

RAPID SYNTHESIS OF SILVER CHLORIDE NANOPARTICLES USING INDIAN COW URINE: - AN INDIAN VEDIC DIVINE,

BY ABHAY KR. AMAN, PH.D. SCHOLAR AND RAKESH KR. SINGH, HEAD OF THE NANOSCIENCE CENTER

EXPLORING THE SIGNIFICANCE OF ANIMAL WASTE INTO WEALTH & KNOWLDGE



Maximum absorption of UV radiation in this materials results cosmetics industry and better action on T.B patients as a nanomedicine. We are in planning to file a patent of this work, May be a potential, suitable for biological optoelectronics, in cosmetics and others applications. This work also highlight the Indian cow urine and their importance. Recently Govt. of India initiated the research work on cowdung & Urine

RESEARCH DRIVEN LEARNING (SCIENCE AND RESEARCH IN MY LIFE)

TEACHING THROUGH LOW COST EXPERIMENT

ADVOCATING **NATURAL PROCESS OF LEARNING FOR INNOVATION (AT ALL LEVELS OF STUDY)**

Initiative of Prof. H.C.Verma, IIT Kanpur (Innovative practices of learning Science)

Teaching Science Through Experiment

Dr. Rakesh Kr Singh, head of the Nanoscience center developed about 300 low cost science experiment, under the supervision of eminent academician Prof. H.C.Verma, IIT Kanpur and demonstrated these experiment under various situations including classrooms/ conferences, public lecture. As an impact, they observed that such low cost teaching through experiment is very effective tools for concept building and interest generation in basic science and scientific research. We have conducted more than 50 workshops with such low cost experiments, including in **RashtriyaAviskarAbhiyan programme&Unnat Bharat Abhiyan**

-Initiative of Govt. of India The main objective of this programme highlights- 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.

Impact assessment- In last 10 years, we have conducted more than 65 workshops with the help of such experiments. These workshops have attracted attention of students and encouraged them to ask relevant questions in science at all levels of study. Such efforts have also helped in demystifying scientific research and developing scientific thinking in students/ faculty members. The present Government has taken several steps for developing research within the country in frontline areas such as Nanotechnology, Biotechnology and Information technology. Such innovative practices supplement this move by helping create interest in basic understanding in science without which cutting edge research is not at all possible.