A Report

On The Physics Webinar Conducted

On 12th June 2020

Topic:

Recent Advances In Nano Science & Radiation Physics

Content:

Centenary Celebrated Sharnabasaveshwar Vidya Vardhak Sangha's

SHARANABASVESHWAR COLLEGE OF SCIENCE

(Affiliated to Gulbarga University, Diamond Jubilee Celebrated & ISO Certified)

Vidya Nagar, Kalaburagi-585103, Email Id:sbcscg@gmail.com

Under IQAC Initiative

Department of physics

Organizes

ONE DAY NATIONAL WEBINAR

On

"Recent Advances In NanoScience & Radiation Physics"

***

With the Divine Blessings of

Poojya Dr.Sharnbaswappa Appaji

Mahadasoha Peetadipathi,Sharanabasveshawara Samasthana

Preskient, Sharanabasveshwara Vidhya Vardhak Sanga

Chancellor, Sharnbasva University, Kalaburagi

In the August presence of

Sri. Basawaraj S. Deshmukh

Secretary, Sharnabasaveshwar Vidhya Vardhak Sangha, Kalaburagi

***

Session -I

Dr. Basawaraj Angadi

Associate Professor, Department of Physics,
Bangalore University, Bangalore

Session-II

Dr. Shanmukappa B. Kaginelli

Associate Professor. Division of Medical Physics, Faculty Of life sciences,
JSS Academy of higher Education & Research, Mysore

***

President

Dr. S. G. Dollegoudar Patil

Principal, Sharanabasaveshwara College of Science, Kalaburgi

Date: 12 June (Friday) 2020. **Time: 10.00 AM to 1.00 PM**

Through Zoom meet: https://us04web.zoom.us/j/2211117602?pwd=OXNpclBFU2kaeHVZd1VYV0o3cGozZz09

Meeting ID: 221 111 7602 Password: 824632

Link for Regi:https://docs.google.com/forms/d/1ZxMtd3EXpVW9L3bBbOfJ_1mlhkaQTndSLI6HNlZ5a2Y/edit

Note: E-Certificate Will be issued to all Registered and Active participants after the Submission of Feedback Form
(Feedback link will be sent through respective E-mail id)

Organizing Secretary	IQAC Co-ordinator	Academic activity Co-ordinator	Principal
Dr. Chitralekha A.	Dr.Omprakash S.	Dr.Trimbak V biradar	Dr. S G Dollegoudar Patil

Centenary Celebrated Sharanabasaveshwar Vidhya Vardhak Sangha's

SHARANABASAVESHWAR COLLEGE OF SCIENCE

(Affiliated to Gulbarga University, Diamond Jubilee Celebrated and ISO Certified)

Vidya Nagar, Kalaburagi-585103, Email Id:sbcsca@gmail.com

Through: ZOOM APP.

Zoom Id: 221 111 7602

Password: 824632

Under the IQAC Initiative

Dept of Physics Organizes

Date: 12.06.2020

Time: 10:00 Am to 1.00 Pm

One Day National Webinar on: *Recent Advances in Nano Science and Radiation Physics*

In the August Presence of

Sri. Basawaraj S. Deshmukh

Secretary. Sharanabasaveshwar Vidhya Vardhak Sangha, Kalaburgi

Session - I

Topic: Recent Advance In Nano Science

Resource Person:

Dr. Baswaraj Angadi

Asso.Prof. BU Bangalore

Session - II

Topic: Radiation Applications and Future

Resource Person:

Dr. Shanmukhappa Kaginelli

Asso.Prof. JSS Acadmy Of Higher Edu. & Research, Mysore

Organising Secretary	IQAC Cordinator	Academic Activity Co-Ord	Principal
Dr. Chitralekha A	Dr. Omprakash S.	Dr. Trimbak V. Biradar	Dr. S.G.Dollegouder

Reg Link: https://docs.google.com/forms/d/1ZxMtd3EXoVW9L3bBbOfJ_1mIhkaQTndSLI6HNIZ5a2Y/edit

Program Schedule:

SHARNBASVESHWAR
COLLEGE OF SCIENCE, KALABURGI

Under the IQAC Initiative & Dept. of Physics
Organizes

One Day National Webinar on

"Recent Advances In Nano Science & Radiation Physics"

Through: ZOOM APP Date: 12. 06. 2020Time: 10:00 AM

.Registration Link:
https://docs.google.com/forms/d/1_tkK3MWilQxVlMmsIFTiBGdA0AdWCKODheu3T8t1yV4/edit

Program Schedule:

1. Welcome and Introduction of the Guests (instruction to restart the ZOOM app after 40min duration)
2. Address by Honorable Secretary Sir.
3. Start of Session – I: By Dr. Basavaraj Angadi. Asso. Professor,Department of Physics,Bangalore.
4. Start of Session – II: By Dr. Shanmukhappa B Kaginelli. Asso. Professor,Division of Medical Physics,Faculty of Life Sciences,JSS Academy of Higher Education &Research,Mysore.
5. Presidential Remark -By Dr. Ramkrishn Reddy sir.
6. Vote of thanks: Dr. Omprakash S.

Organising Secretary
Dr. Chitralekha Alur
Asso Prof. Dept. of Physics
Sharanabasaveshwar College of Science, Kalaburagi.

Principal
Dr. S G Dollegoudar Patil

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Join through link:https://us04web.zoom.us/j/2211117602?pwd=OXlpclBFU2laeHVZd1VVV0o3cGozZz09**Meeting ID: 221 111 7602Password: 824632**

Welcome Speech

Seeking the blessings of lord Sharnabasweshwar and his holiness Poojya Doddappa Appa and my humble pranamas to the lotusfeet of Dr.Sharanabasavappa Appaji, President of SharnabasweshwarVidyaVardhakSangha,8thMahadasohPeethadhipati,Vidyabhandari Chanceller Sharanbasava University Kalaburagi.

Honorable Secretary of the SBVVS Sangha, Shri Baswaraj Deshmukh, Respected Principal of Sharnabasweshwar College of Science Dr. S.G. Dollegoudar Sir esteemed Faculty members of the institution Guest speakers of today's Webinar and all the participants, Good morning to you all.

At Present Scenario,as we know,the education system is completely collapseddue to Covid-19.At this critical juncturesthis type of online webinars placed important role to makethe education system alive,

Inview of this Physics department has organized the one day National seminar on Recent Advances in Nanoscienceand Radiation Physics.

On behalf of the management and on behalf of the Sharnabasweshwar Science college Kalaburagi, I whole heartedly welcome you all once again.

Today the world is combating with deadly COVID -19 Virus. All the scientific communities working day and night to find the medical remedy to irradiate it. So far no one has succeeded in finding the molecular bullet that can destroy or rupture the covid virus DNA molecule.

The basic problem lies in the fact that, even though there exist hundreds of the methods to study the matter at the small dimensions but still we have not yet learnt how to explore the matter at the nano level and further.

In order to know the behavior of the matter at such level, it must be scientifically prepared ready, in the form of the research sample using different methods and techniques.

Today's webinar focuses on twoconcepts:nanoscience and radiation physics. we are very fortunate to have an eminent speaker for

Nanoscience, session –I of the Webinar that is Dr. Basavaraj Angadi, Associate Professor Department of Physics Bangalore University,Bangalore. He has a vast research experience in Nano science and Nanotechnology. I welcome you sir.

Similarly for session – II we have another eminent guest speaker, Dr ShanmukappaKaginelli Associate professor in Devision of Medical Physics,Faculty of Life Sciences,JSS Academy of Higher Education Research ,Mysore. On behalf of management, principal and faculty members and all the participants I welcome you sir.

Now I request Dr. Basavaraj Angadi to begin the session

Note: as entire webinar is being conducted on Zoom app. It gets discontinued after 40 minutes. I request all the participants that if it happens so then immediately after it discontinues please rejoin the webinar once again. And while the webinar is in progress kindly mute your microphones to avoid the disturbance.

Dr. BasavarajAngadi, M.Sc., M. Phil., Ph.D.

Associate Professor,

Department of Physics,

Bangalore University,

Bangalore – 560 056

Phone : +91-22961478,

E-mail : brangadi@gmail.com ; brangadi@bub.ernet.in

Researcher ID:http://www.researcherid.com/rid/B-2459-2010

Publons : https://publons.com/a/999042/

Academic Qualifications

- **Ph.D.** (2004), Department of Physics, Gulbarga University, Gulbarga, India
- **M.Phil.** (1998), Department of Physics, Gulbarga University, Gulbarga, India
- **M.Sc.** (1997), Department of Physics, Gulbarga University, Gulbarga, India
- **B.Sc.** (1995), Gulbarga University, Gulbarga, India

Positions held (Research Experience)

- **Associate Professor** (2019 – Present), Department of Physics, Bangalore University, Bangalore , India
- **Assistant Professor** (2007 – 2019), Department of Physics, Bangalore University, Bangalore , India
- **Visiting Scientist** (2005 – 2007), Materials Research Centre, Korea Institute of Science and Technology, Seoul, Korea
- **Postdoctoral Fellow** (2005– 2006), Institute of Physics and Applied Physics, Yonsei University, Seoul, Korea
- **Research Associate** (2003 – 2004), Materials Research Center, Indian Institute of Science, Bangalore, India

Research Interests

- **Metal Oxide - Carbon Materials core-shell quantum-dots**

  · Synthesis and applications of ZnO-Graphenecore-shell quantum-dots based multilayer-hybrid structures for electro-optic applications

  · Synthesis and applications of ZnO-C60 core-shell quantum-dots based multilayer-hybrid structures for electro-optic applications

  Pure and doped Metal Oxide (ZnO, TiO_2, SnO_2) thin films and nanomaterials

  · ZnO – Nanomaterials Synthesis using solution combustion technique and characterization using XRD, TEM, NEXAFS, XMCD, etcfor applications inspintronics as a DMS.

  · ZnO – Thin films depositedthrough RF sputtering, Spin coating, and Spray pyrolysis and characterization using XRD, AFM, Optical (UV-Vis., PL), electrical for applications in electro-optics, Sensing, transparent conducting electrodes.

  ·SnO_2, TiO_2 – Thin films deposition by Spray pyrolysis and characterization using XRD, Optical, SEM and electrical for sensing and electro-optic applications

- **Bulk Multiferroics**

  ·$Pb(Fe_{1/2}Nb_{1/2})O_3$ (PFN) - $Pb(Fe_{2/3}W_{1/3})O_3$ (PFW) : Synthesis and studies on magneto-electric and spin-lattice coupling studies using temperature dependent dielectric(ferroelectric), magnetic and Neutron diffraction studies across T_C and T_N

  · $BiFeO_3$ (BF) – PFN and PFW :Synthesis and studies on magneto-electric and spin-lattice coupling studies using temperature dependent dielectric(ferroelectric), magnetic and Neutron diffraction studies across T_C and T_N

Membership of Professional National and International Bodies

· Life Member of Indian Ceramic Society

· Life Member of Materials Research Society of India

· Life Member of Indian Physics Association

· Member of Korean Physical Society

· Executive Council Member of Ion Beam Society of India

Membership/Chairman of Board of Studies (BOS)

·Member, Board of Studies in Physics (PG), Department of Physics, Bangalore University – 2017-2020

· Member, Board of Studies in Physics (PG), Department of Physics, Bangalore Central University – 2018-2021

·Member, Board of Studies in Electronic Science (PG), Department of Electronic Science, Bangalore University – 2017-2020

· Member, Board of Studies in Physics (PG), Department of Physics, Government College, Mandya (Autonomous) – 2017-2020

Membership/Chairman of Board of Examination (BOE)

·Member, Board of Examination in Physics (PG), Department of Physics, Bangalore University – 2016-2017, 2018-19, 2019-20

· Member, Board of Examination in Electronic Science (Ph.D. Course work), Department of Electronic Science, Bangalore University – 2016-2017

· Chairman, Board of Examination in Physics (UG-Professional Board), Department of Physics, Bangalore University – 2016-2017,

· Member, Board of Examination in Physics (UG-Professional Board), Department of Physics, Bangalore University – 2010-2019, 2019-20

·Member, Board of Examination in Electronic Science (PG), Department of Electronic Science, Bangalore University – 2014-2015, 2017-18, 2018-19

· Member, Board of Examination in Physics (PG), Department of Physics, Davanagere University –2018-19

· Member, Board of Examination in Physics (PG), Department of Physics, VSK University, Ballary –2017-18, 2019-20

· Member, Board of Examination in Materials Science (PG), Department of Materials Science, Gulbarga University – 2014-2015

Research Collaboration

·Future Convergence Research Division, Korea Institute of Science and Technology (KIST), Seoul, Korea

·Institute of Advanced Composite Materials, Korea Institute of Science and Technology (KIST), Jeonbuk, Korea

· Institute of Physics and Applied Physics, Yonsei University, Seoul, Korea

· Department of Physics, Tamkang University, Taipei, Taiwan

·UGC–DAECSR,MumbaiCentre, Mumbai, India

·UGC–DAECSR,MumbaiCentre, Indore, India

·UGC–DAECSR,Kalppakkam Node, Kokilamedu, India

· IGCAR, Kalpakkam, India

· Materials Research Centre, Indian Institute of Science, Bangalore, India

· Inter-University Accelerator Centre, New-Delhi, India

Awards/Fellowship

- **Sir C. V. Raman Young Scientist,** State Award for the year 2013 from Government of Karnataka
- Award for **Best Publication** (2012-13) from VGST, Govt. of Karnataka
- **Short term visiting fellow**: Korea Institute of Science and Technology, Seoul, Korea, one month every year during 2009, 2010, 2011, 2012, 2013, 2014, 2016, 2017
- **Brain Korea Fellow** during 2005-06 at Yonsei University, Seoul, Korea
-

Research projects

Coordinator, Centre for Potential Excellence in Particular Area (CPEPA), Department of Physics, Bangalore University, Bangalore 2017-18, 100 Lakhs (Physics)

- "Synthesis and Studies on Magneto-Electric and Spin-Lattice Coupling in $Pb(Fe_{1/2}Nb_{1/2})O_3$-$BiFeO_3$ and $Pb(Fe_{2/3}W_{1/3})O_3$-$BiFeO_3$Multiferroic solid solutions" (Principal-investigator) sanctioned by UGC-DAE-CSR Mumbai, 2015-17, ~8.85 Lakhs
- "Synthesis and Studies on Magneto-Electric and Spin-Lattice Coupling in $Pb(Fe_{1/2}Nb_{1/2})O_3$ based Multiferroic systems" (Principal-investigator) sanctioned by UGC-DAE-CSR Mumbai, 2011-14, 8.85 Lakhs
- "Synthesis and studies on magnetic properties of doped Zinc Oxide nano powders and thin films" (Principal-investigator) sanctioned by UGC-DAE-CSR Kalpakkam, 2012-15, 7.6 Lakhs
- "Design and characterization of proto-type Carbon Nanotube based micro-strip antennas" (Co-investigator) sanctioned by CARS (DRDO), 2012-15, 7.72 Lakhs
- "Studies on ZnO based p-type and dilute magnetic semiconductors synthesized by solution combustion and spray pyrolysis techniques" sanctioned byBURIF - Bangalore University, 2011-12, 1 Lakh

Ph.D. Guidance: Awarded – 05;Submitted – 00 ; Working - 04

Research Publications (*h*-index:23) : More than 100 research papers are published in International and National journals .

P ERSONAL RESUME

NAME	**DR. SHANMUKHAPPA B KAGINELLI**
Official Address	Associate Professor, Division of Medical Physics, Faculty of Life Sciences, JSS Academy of Higher Education & Research, Sri Shivarathreeswara Nagar MYSURU-570015. e-mail: drsbkaginelli@gmail.com Phone No : 9902244859 
Permanent Address	Dr. Shanmukhappa B Kaginelli A/p : Guddadamadapur Tal. : Hirekerur, Dist. : Haveri-581210
Educational Qualification	1.Master Degree (M.Sc.) in Physics from Karnataka University, Dharwad 2.Post Graduate Diploma in Radiological Physics (Dip.R.P) from Bhabha Bhabha Atomic Research Center / Bombay University, Mumbai 3.Doctor of Philosophy (Ph.D.) from Gulbarga University, Gulbarga, under the Guidance of Dr. B R Kerur
Experience	**1.** 1991-2009 – Worked as Medical Physicist Cum Radiation Safety Officer at Kidwai Memorial Institute of Oncology, Bangalore, (Gulbarga). **2.**May 2009- Sept. 2011 worked as Facility In-Charge& Radiation Safety Officer, at Gamma Agro-Medical Processings Pvt. Ltd., Hyderabad. (Gamma Radiation Sterilization Plant). **3.** Having teaching experience as (Honorary Asst. Professor at M R Medical College, Gulbarga) in Diagnostic Radiology. **4.**Sept. 2011-2013 worked as Associate Professor at M R Medical College, Gulbarga cum Radiation Safety Officer at VTSM, Peripheral Cancer Centre, Gulbarga (Attached to M R Medical College). **5.** Jan.2014-June 2017 worked as Associate Prof./Medical Physicist / Radiological Safety Officer at S S Institute of Medical Sciences & Research Centre (Bapuji Cancer Hospital), Davangere. **6.** Since July 2017 working as Associate Professor at Division of Medical Physics, Faculty of Life Sciences, JSS Academy of Higher Education & Research, Mysuru
Academic	Attended National & International AMPI(Association of Medical Physicists of India) Conferences, Presented the Papers and Published in JMP (Journal of Medical Physics) & other Science Magazines. Attended the Nuclear Medicine & Dosimetric Workshops. Attended & Presented paper in Kannada Vijnana Sammelana's and awarded "**Best Paper Presentation**" award. Awarded ***"Meritorious Physicist"*** by AMPI (Association of Medical Physicists of India) during 34th Annual National Conference of AMPI-Conference-2013 at Kolkata
Other Activities	Taken the lead in WHO Sponsored Tobacco Survey in rural area of Gulbarga District (About 250 Villages), Taken roll in the Cancer Detection Camps. Participating in the Anti-Tobacco & Anti-Alcohol Campaign with NGO's & Govt. Organizations. Also involving in the Environmental Awareness Programmes with pollution control Board & other NGO's.

Dr. Shanmukhappa Kaginelli

Papers Published/Communicated to Journals:

1. **Effective atomic numbers and electron density of dosimetric material**
   S. B. Kaginelli, T. Rajeshwari, Sharanabasappa, B. R. Kerur, Anilkumar S.
   Journal of Medical Physics,Vol. 34, No. 3, 2009,176-179.

2. **Mass Attenuation Coefficient of Chromium and Manganese Compounds around Absorption Edge.**
   Sharanabasappa**, S B Kaginelli**, B R Kerur, S Anilkumar and B Hanumaiah. Journal of X-Ray Science and Technology 17 (2009) 75-84.

3. **Effective Atomic Numbers for Dosimetric Materials**
   B R Kerur, **S.B.Kaginelli,** M T Lagare and S Anil Kumar

   Journal of Medical Physics Vol.31(3), 176, 2006.

National/International/conferences/workshops:

1. **Effective Atomic Numbers for Dosimetric Materials.**
   International Conference on Medical Physics & 27th Annual Conference of Association of Medical Physicists of India, 2006.
   Hemalata Hospitals & Research Centre, Bhubneswar, 9-12 Nov. 2006. B R Kerur, **S.B.Kaginelli,** M T Lagare and Anil Kumar S

2. **Study of x-ray Mass Attenuation Coefficients using HPGe Detector.**
   Gayatri B. Prasad, Sharanabasappa**, S B Kaginelli**, B R Kerur, S Anilkumar & B Hanumaiah. Tromby, Symposium on Radiation & Photochemistry. YASHADA, Pune, January 7-11, 2008.

3. **Post edge structure effects on mass attenuation coefficients.**
   B R Kerur, Sharanabasappa**, S B Kaginelli** and Anilkumar S.

   European Conference on X-Ray spectrometry. 16-20 June 2008, Cavtat, Dubrovnik, Croatia.

4. «««zÀ PÉÃvÀÛ¼À° «Qg¼t ¸ÀÆ¸À¼ª¼À ªÀ¸ÀÄÛ¼À (L¸ÉÆÃmÉÆ¥ÀÛ¼ÀÄ) ±ÁAwA¼ÀÄÃvÀ G¥ÀAÉÆÃÛÀÛ¼ÀÄ.
   J¸ï.©.PÁV£É°, ±Àg¼t§¸À¥À, ©.Dgï. PÉgÀÆgÀ.
   4£ÉÃ PÀ£À¤qÀ «eÁ£À ¸ÀªÉÄïÃ¼À£À (Swadeshi Vijnana Andolana-Karnataka)
   «±ÉÃ±ÀgÀA¼ÀÄå ÁwPÀ «±À«z å®A¼ÀÄ, ¨É¼ÀÛ «Á
   15-17 ¸É¥ÉA§gï 2008, " £Àq ª¼À " (220-221)

5. **Effective atomic numbers and electron density of dosimetric material.**
   International Conference on Medical Physics & 29th Annual Conference of Association of Medical Physicists of India, 2008.
   S. B. Kaginelli, T. Rajeshwari, Sharanabasappa, B. R. Kerur, Anilkumar S.

   Multi Purpose Hall, BARC, Anushaktinagar, Mumbai-400094.November 26-29,2008.

6. **CªÉÄÃ£ÉÆÃ,J¹qïÛ¼À ªÀÄvÀÄ ¸ÀPÀgÉÛ¼À QÃt ªÁÛ¼ªÀ ¥À¸juÁªÀ¼ÀPÁ¸j Ct¼«£À ¸ÀASÉå ªÀÄvÀÄ JPÁ£ï ¸ÁAzÀvÉA¼ÀÄ MAzÀÄ CzÀåA¼ÀÄ£À.**

   ²ªÀ°Ã¯ Á J ªÀ¼ïï.«., J¸ï.©.PÁV£É°, ©.Dgï. PÉgÀÆgÀ.

   5£ÉÃ PÀ£À¤qÀ «eÁ£À ¸ÀªÉÄïÃR£À (Swadeshi Vijnana Andolana-Karnataka)
   ªÀÄAÛ¼ÀÆgÀÄ «±À«z å®A¼ÀÄ, ªÀÄAÛ¼ÀÆgÀÄ,
   15-17 ¸É¥ÉA§gï 2009, " £Àq ª¼À " (83-84)

7. **Study of Braggs Additivity Law Near L Absorption Edge.**
   Sharanabasappa, **S B Kaginelli**, B R Kerur, S Anilkumar. 18th National Symposium on Radiation Physics (NSRP-18).
   Department of Physics, M. L. Sukhadia University, Udaipur. November 19-21, 2009.

«ÄÂ±ÀÀt ¸ÀÆvÀzÀ CzÀåAÀÀÄ£À ªÀÄvÀÄ CzÀgÀ G¥ÀAÉÆÃUÀUÀ¼ÀÄ.
±ÀgÀt§¸À¥À, **J¸ï.©.PÁV£Ï°,** ©.Dgï. PÉgÀÆgÀ.

6ÉÊÃ PÀ£ÀßqÀ¯ÁªÉe £À ¸ÀªÉÄÃmÃR£À (Swadeshi Vijnana Andolana-Karnataka)
¥À¸ÀÄªÉÊzÀåQÃAiÀÄ ªÀÄºÁ «zÁå®AiÀÄ, ºÉ¸ï ¥ÀÀ, ¸ÉÃUÀ¼ÀÆgÀÄ,
15-17 ¸É¥ÉA§gï 2010, " £ÀqÁ¼À½ " (44-45)

8. K-edge Effect on Effective Atomic Numbers and Electron Density of Rare Earth Dosimeters.
Manjunath A, **S B Kaginelli**, Chitralekha, Sharanabasappa, & B R Kerur.
32nd National Conference on Medical Physics (AMPICON-2011),16-19 Nov. 2011,
Christian Medical College, Vellore.

9. «QgÀt ¸ÀÆ¸ÀÏªÀ ªÀ¸ÀÄUÀ½AzÀ DºÁgÀ ªÀÄvÀÄ DºÁgÀ GvÀ£ÀUÀ¼À°£À Q«ÄUÀ¼À ±ÀÄçÃPÀgÀt.
J¸ï.©.PÁV£Ï°, ©.Dgï. PÉgÀÆgÀ. n. g ÁgÉÃ±À¡j, ±ÀgÀt§¸À¥À, ªÀÄAdÄ£ xÀ ¥Á.
7ÉÊÃ PÀ£ÀßqÀ¯ÁªÉe £À ¸ÀªÉÄÃmÃR£À (Swadeshi Vijnana Andolana-Karnataka)
UÀÄ®§U ð «±À«zÁå®AiÀÄ, UÀÄ®§U ¯ð.
15-17 ¸É¥ÉA§gï 2011, " £ÀqÁ¼À½ " (103-106) ISSN 2249-5757 Vijnana Kannada (Print)
" CvÀÄåvÀªÀÄ ¥À§AzÀªÀÄAqÀ£Ï ¥À±À¹ "(Best Oral Presentation Award) ¤ÃqÀ¯ VzÉ.

10. Quality determination of Pharmaceutical Drug through Mass attenuation Coefficient: A Non-destructive Method.
Manjunath A, **S B Kaginelli**, B R Kerur and Rajesh S

33rd National Conference on Medical Physics (AMPICON-2012),1-3 Nov. 2012, Mangalore.

11. "National Seminar on Radiation Physics"
Dept. of Physics, Gulbarga University, Gulbarga.
March 17-18 2011.

12. "National Seminar and Cafe Scientifique on Trends in Physics"
Dept. of Physics, Gulbarga University,
Gulbarga. 20th Dec. 2005.

13. "Special Series for Pg Students of Physical Sciences"
Dept. of Physics, Gulbarga University,
Gulbarga. Nov. 5-7 2007.

Session – I: By Dr. Basavaraj Angadi. Asso. Professor,Department of Physics,Bangalore.

Recent Advances in Nanoscience and Technology

Basavaraj Angadi

Department of Physics
Bangalore University
Bangalore

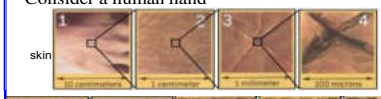
brangadi@gmail.com

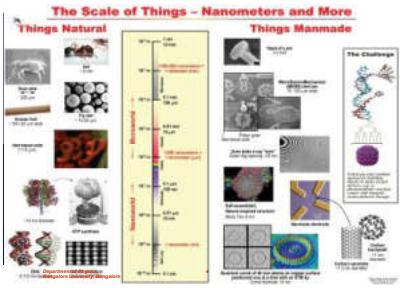
Outline of the Talk

- What is a nanometer?
- Quantum Dots : Size dependent properties
- Introduction : ZnO and Graphene
- ZnO-Graphene QDs
- ZnO-Graphene QD based devices
- Summary

How big is a nanometer?

Consider a human hand





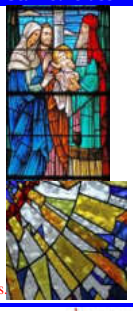
What is Nanoscience?

- The study of objects and phenomena at a very small scale, roughly 1 to 100 nanometers (nm)
- An emerging, interdisciplinary science involving
  - Physics, Chemistry, Biology, Engineering, Materials Science, Computer Science

What is Nanotechnology?

- The design, characterization, production, and application of structures, devices, and systems by controlled manipulation of size and shape at the nanometer scale

Historical Use of Nanoparticles: Stained Glass

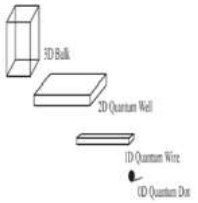


Red stained glass gets its colour from nanoparticles of gold that are only 20 nanometres across.

Orange glass gets its colour from gold nanoparticles that are 80 nanometres across.

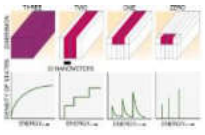
Quantum confinement

- 3-D or Bulk materials
  - Carriers are free to move in all 3D
  - No confinement
- 2-D or Quantum Wells
  - Carriers are free to move in 2D (plane)
  - 1D confinement
  - Observed in semiconductor
- 1-D or Quantum Wires
  - Carriers are free to move in 1D
  - 2D confinement
- 0-D or Quantum Dots
  - Carriers are free to move in 0D (no free carriers)
  - 3D confinement



Quantum confinement

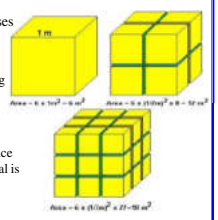
- So what if a material is confined in one direction?
- As the material becomes confined its Density of States changes
- In the confined direction you can think of the carriers as particles in boxes



Surface to tfolume Ratio Increases

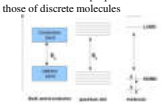
As surface to volume ratio increases

- A greater amount of a substance comes in contact with surrounding material.
- This results in better catalysts, since a greater proportion of the material is exposed for potential reaction.



Quantum Dots : 0-D Materials

- Quantum dots are semiconductor nanocrystals having the sizes in the range from 2-10 nanometers (10-50 atoms) in diameter.
- Excitons inside the Quantum dots are confined in all three spatial dimensions. Consequently, such materials have electronic properties intermediate between those of bulk semiconductors and those of discrete molecules



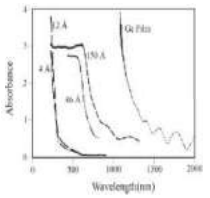
- Obey Quantum mechanical principle of Quantum confinement
- QDs act like artificial atoms, showing controllable discrete energy levels
- Show narrow emission peak and broad excitation range
- The energy band gap increase with a decrease in size of the dot

Experimental Observation of confinement

- Just imaging a small dot is not enough to say it is confined
- Optical data allows insight into confinement
  - Optical Absorption
  - Raman Vibration Spectroscopy
  - Photoluminescence Spectroscopy

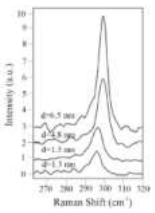
Optical Absorption

- Optical Absorption is a technique that allows one to directly probe the band gap
- The band gap edge of a material should be blue shifted if the material is confined
- Bukowski et al. present the optical absorption of Ge quantum dots in a SiO_2 matrix.
- As the dot decreases in size there is a systematic shift of the band gap edge toward shorter wavelengths



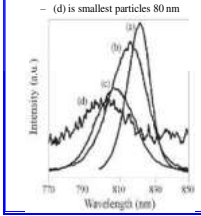
Raman Vibrational Spectroscopy

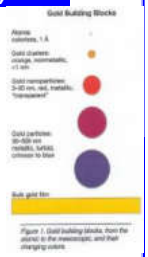
- Raman vibrational spectroscopy probes the vibrational modes of a sample using a laser
- As the nanocrystal becomes more confined the peak will broaden and shrink
- Here we see a peak shift toward the laser line
- Various Ge dots of different sizes on an Alumina film



Photoluminescence Spectroscopy

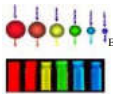
- Photoluminescence spectroscopy is a technique to probe the quantum levels of quantum dots
- Here we see dots of various size in a quantum well
  - (a) is quantum well spectrum
  - (d) is smallest particles 80 nm



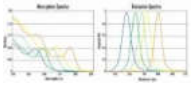


Size dependent properties

Size: ~ 8nm ~2 nm



Emission from Colloidal CdSe Quantum Dots Dispersed in Hexane

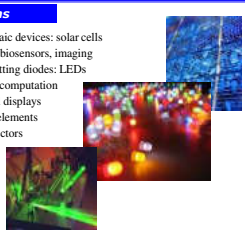


Smaller QDs have stronger confinement making the energy gap larger. Similarly, a larger size gives a smaller energy gap

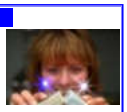
Applications

Applications

- Photovoltaic devices: solar cells
- Biology : biosensors, imaging
- Light emitting diodes: LEDs
- Quantum computation
- Flat-panel displays
- Memory elements
- Photodetectors
- Lasers



Quantum Dot LEDs (QLEDs)



•Quantum Dot Light Emitting Diodes (QLEDs) are superior to standard LEDs in the same ways the quantum dots are superior to bulk semiconductors.

• The tunability of QDs gives them the ability to emit nearly any frequency of light - a traditional LED lacks this ability.

• Quantum dot-based LEDs can be crafted in a wide range of form factors.

• Traditional incandescent bulbs may be replaced using QLED technology, since QLEDs can provide a low-heat, full-spectrum source of light.

Core-Shell QDs

Core-Shell Quantum Dot refers to a Quantum-Dot surrounded by a shell of higher band-gap semiconductor.

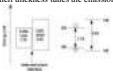
II–VI, IV–VI, and III–V semiconductors, with configurations such as CdS/ZnS, CdSe/ZnS, CdSe/CdS, and InAs/CdSe

Precise control of the size, shape, and composition of the core and shell enable the emission wavelength to be tuned over a wider range of wavelengths than with either individual semiconductor

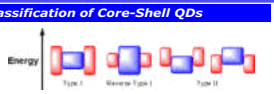
Covering the surface of a Quantum Dot reduces non-radiative decay of electrons close to the surface and thus enhances luminescence intensity.
In addition, the shell provides protection against environmental changes, photo-oxidative degradation, and provides another route for modularity

Classification of Core-Shell QDs

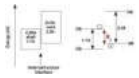
•In a Type I CSSNC, the bandgap of core is smaller than that of the shell. Both the conduction and valence band edges of the core lie within the bandgap of the shell, which confines both electrons and holes in the core, CdSe(bandgap:1.74 eV)/CdS(bandgap:2.42 eV)
•In the reverse type I configuration, the core has a wider bandgap than the shell, and the conduction and valence band edges of the shell lie within those of the core. The lowest available exciton energy separation occurs when the charge carriers are localized in the shell. Changing the shell thickness tunes the emission wavelength.



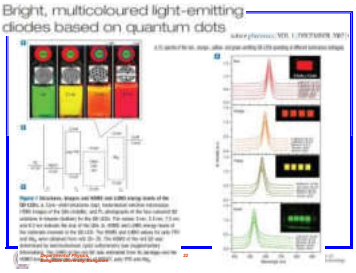
Classification of Core-Shell QDs



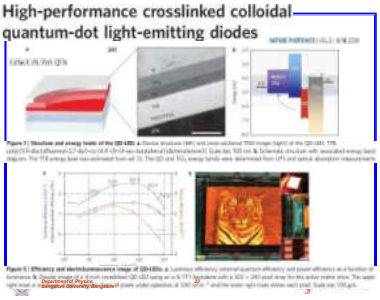
•In the type II configuration, the valence and conduction band edge are both lower or higher than the band edges of the shell. ZnTe(bandgap:2.26)/CdSe(bandgap:1.74)
•The lowest energy separation of the electron and the hole will occur when the hole is confined in the ZnTe core valence band and the electron is confined in the CdSe shell conduction band.



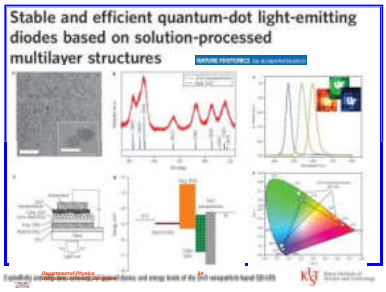
Bright, multicoloured light-emitting diodes based on quantum dots



High-performance crosslinked colloidal quantum-dot light-emitting diodes



Stable and efficient quantum-dot light-emitting diodes based on solution-processed multilayer structures



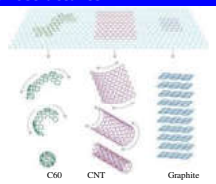
Graphene

➢Graphene is a one-atom-thick sheet of carbon that was isolated for the first time in 2004
➢Graphene's 2D nature and honeycomb atomic structure cause electrons moving in the material to behave as if they have no mass
➢Electrons in graphene move at an effective speed of light 300 times less than the speed of light in a vacuum, allowing relativistic effects to be observed without using particle accelerators
➢A key experimental signature of graphene is the way it modifies the quantum Hall effect seen in metals and semiconductors
➢The electrons in graphene can travel large distances without being scattered, making it a promising material for very fast electronic components

Graphene

A. K. Geim & K. S. Novoselov University of Manchester, Manchester, UK
2010 Nobel Prize in Physics winners

Graphene as a building block for all Carbon nanostructures



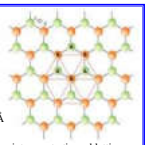
C60 CNT Graphite

Mother of all graphitic forms. Graphene is a 2D building material for carbon materials of all other dimensionalities. It can be wrapped up into 0D buckyballs, rolled into 1D nanotubes or stacked into 3D graphite.

A. K. Geim & K. S. Novoselov, The rise of graphene, Nature Materials 6, 183-191 (2007).

Crystal structure of Graphene

First Brillouin zone



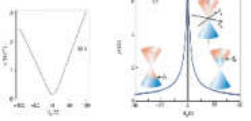
C – C bond length = 1.42 Å

- The honeycomb lattice of Graphene consist of two interpenetrating sublattices
- The sites of one sublattice (green) are at the centres of triangles defined by the other (orange)
- The lattice has two carbon atoms (A and B) per unit cell and is invariant under 120 ° rotation around any lattice site
- Each atom has one *s* and three *p* orbitals. The *s* orbital and two in-plane *p* orbitals are tied up in graphenes stong covalent bonding and do not contribute to its conductivity. The remaining *p* orbital, oriented perpendicular to the molecular plane and hybridizes to form π (valence) and π* (conduction) bands

Graphene - Properties

- Large theoretical specific surface area (2630 $m^2 g^{-1}$)
- High intrinsic mobility (200 000 $cm^2 v^{-1} s^{-1}$)
- High Young's modulus (~ 1.0 TPa) , High fracture strength (125 Gpa)
- Thermal conductivity (~ 5000 $Wm^{-1}K^{-1}$)
- Optical transmittance (~ 97.7%)
- Resistivity of the graphene sheet ~10^{-6} Ω·cm, less than the resistivity of silver (Ag), the lowest resistivity substance known at room temperature
- Good electrical conductivity merit attention for applications such as for transparent conductive electrodes

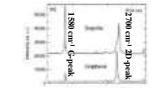
Ambipolar electric field effect in single-layer graphene

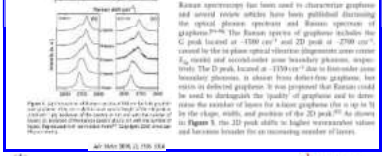


Ambipolar electric field effect in single-layer graphene. The insets show its conical low-energy spectrum *E(k), indicating changes in the position of the Fermi* energy E_F *with changing gate voltage* V_g. *Positive (negative)* V_g *induce electrons*(holes)

The rapid decrease in resistivity *p on adding charge carriers indicates their high mobility (in* this case, *μ =5,000 cm² V⁻¹ s⁻¹ and does not noticeably change with increasing* temperature to 300 K).

Raman Spectra of Graphene





Raman spectroscopy has been used to characterize graphene and several review articles have been published discussing the optical phonon spectrum and Raman spectrum of graphene.[9–16] The Raman spectra of graphene includes the G peak located at ~1580 cm^{-1} and 2D peak at ~2700 cm^{-1} caused by the in-plane optical vibration (degenerate zone center E_{2g} mode) and second-order zone boundary phonons, respectively. The D peak, located at ~1350 cm^{-1} due to first-order zone boundary phonons, is absent from defect-free graphene, but exists in defected graphene. It was proposed that Raman could be used to distinguish the 'quality' of graphene and to determine the number of layers for a few-layer graphene (for n up to 5) by the shape, width, and position of the 2D peak.[9] As shown in Figure 3, the 2D peak shifts to higher wavenumber values and becomes broader for an increasing number of layers.

Applications of Graphene

Applications of Graphene

Preparation of Graphene

Preparation methods

Top-down approach (From graphite)

- Micromechanical exfoliation of graphite (Scotch tape or peel-off method)
- Creation of colloidal suspensions from graphite oxide or graphite intercalation compounds (GICs)

Bottom up approach (from carbon precursors)

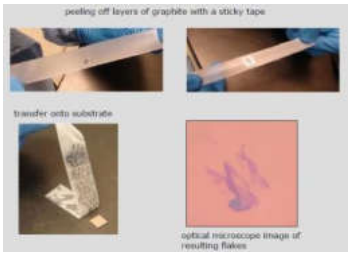
- By chemical vapour deposition (CVD) of hydrocarbon
- By epitaxial growth on electrically insulating surfaces such as SiC
- Total Organic Synthesis

Table 1 - Advantages and disadvantages for techniques currently used to produce graphene.

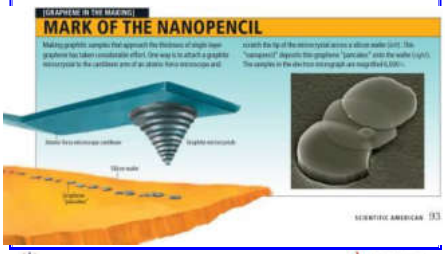
	Advantages	Disadvantages
Mechanical exfoliation	Low cost and easy No special equipment needed. Yes, Thickness is tuned for better contrast	Unreliable Uneven films Labor intensive (not suitable for large-scale production)
Epitaxial growth	Most even films (of any method) Large scale films	Difficult control of morphology and adsorption energy High-temperature process
Graphene oxide	Straightforward up-scaling Versatile handling of the suspension Liquid process	Fragile stability of the colloidal dispersion Reduction to graphene is only partial

Ref: Carbon, 48, 2127–2150 (2010).

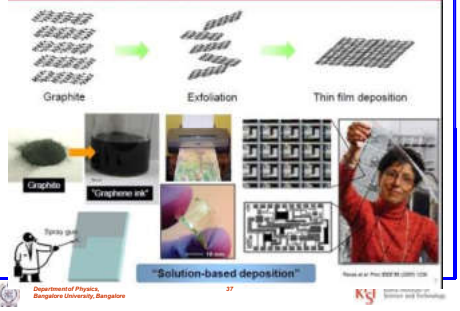
Mechanical extraction of Graphene layers



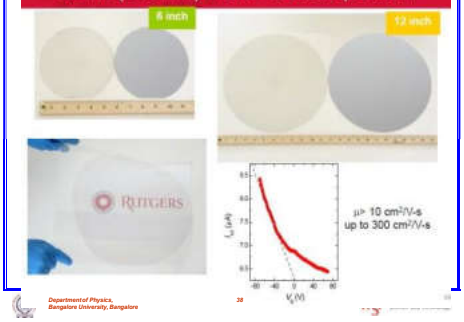
Another Mechanical extraction – nanopencil



"Graphene Inks?"



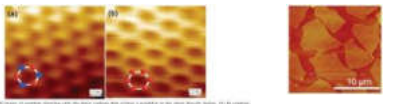
12 in. (300mm) Wafer Scale Deposition



Characterization tools

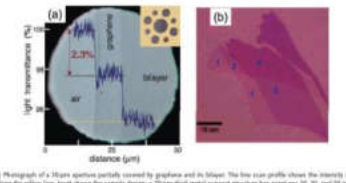
Scanning Probe Microscopy (SPM):	Raman Spectroscopy	Transmission electron Microscopy (TEM)	X-ray diffraction (XRD)

- Atomic force microscopes (AFMs)
- Scanning tunneling microscopy (STM)



Atomic force microscopy images of a graphite oxide film deposited by Langmuir-Blodgett assembly

Optical properties Graphene layers

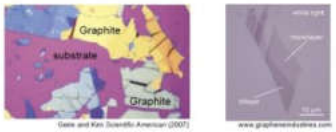


- Monolayer graphene absorbs $\pi\alpha \approx 2.3\%$ of white light (97.7 % transmittance), where α is the fine-structure constant.

Graphene: Challenges

Graphene science is exciting...
Graphene properties are remarkable...
BUT for technological implementation

- Technologically viable deposition method
- Control over deposition areas
- Choice over substrate
- Control over the number of graphene layers
- Reliable growth method

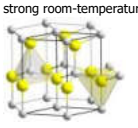


Geim and Kim Scientific American (2007)

www.grapheneindustries.com

ZnO – as a material

- II–VI semiconductor, zinc and oxygen belong to the 2nd and 6th group.
- Direct wide bandgap 3.37 eV
- Tunable bandgap (2.8 – 3.3 eV with CdO; 3.3 – 4 eV with MgO)
- Crystallizes in the wurzite lattice
- Optically transparent with a large exciton binding energy of 60 meV - useful in lasing devices.
- Low power threshold for optical pumping at RT
- Normally n-type, even in the absence of intentional doping.
- High electron mobility, wide band gap, strong room-temperature luminescence.



Applications of ZnO

- Near – UV and blue light-emitters
- UV semiconductor lasers
- Light detectors
- Spintronics
- Waveguide applications
- Varistors
- Transparent high power electronics
- Surface acoustic wave devices
- Piezoelectric transducers
- Gas sensors
- As a window material (TCO) for display and solar cells
- Talcum powder

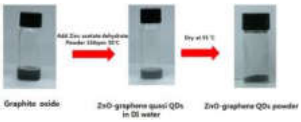
ZnO – Graphene Core-Shell QDs

nature nanotechnology ARTICLES

Emissive ZnO-graphene quantum dots for white-light-emitting diodes

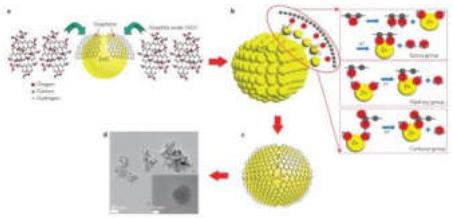
Dong Ick Son[1], Byoung Wook Kwon[1], Dong Hee Park[1], Won-Seon Seo[2], Yeonjin Yi[2], Basavaraj Angadi[2], Chang-Lyoul Lee[2] and Won Kook Choi[2]*

Synthesis of ZnO – Graphene Core-Shell QDs

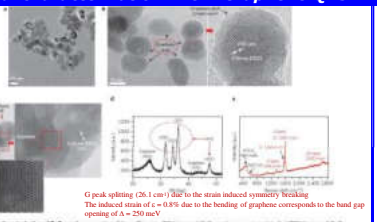


- The graphite oxide (GO) was synthesized from natural graphite using 3:1 mixed acid of HNO_3 and H_2SO_4
- Then the Zinc acetate dihydrate was mixed with the GO in DMF solvent
- The mixed solution was heated to 95 °C and was maintained at that temperature for 5 hours
- The color of the solution changes to white-grayish color, indicating the formation of ZnO-graphene quasi core shell QDs
- The product was subjected to repeated washing with ethanol by centrifugation, and finally with water
- The final ZnO-graphene powder was obtained after drying the product at 55°C

Synthesis of ZnO – Graphene Core-Shell QDs

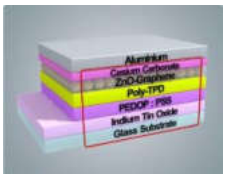


Structural characterization ZnO – Graphene QDs

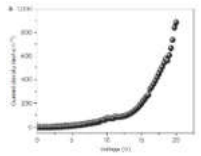


G peak splitting (26.1 cm-1) due to the strain induced symmetry breaking
The induced strain of ε = 0.8% due to the bending of graphene corresponds to the band gap opening of Δ = 250 meV

Hybrid LED structure on ITO coated Glass



Schematic of the fabricated Hybrid LED structure
Includes organic and inorganic layers



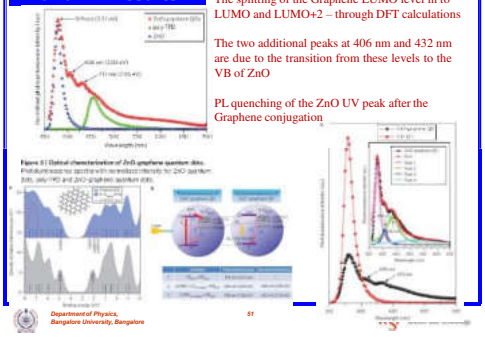
J-V characteristics of the fabricated device showing the turn on voltage of around 11 V

PL and I-V results

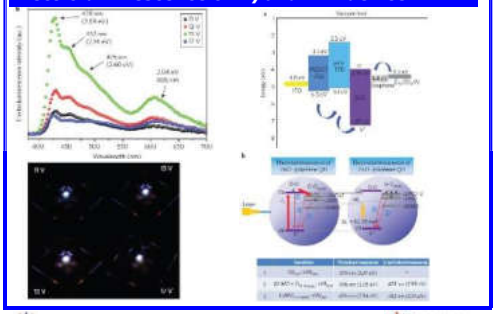
The splitting of the Graphene LUMO level in to LUMO and LUMO+2 – through DFT calculations

The two additional peaks at 406 nm and 432 nm are due to the transition from these levels to the VB of ZnO

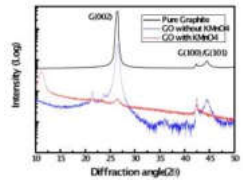
PL quenching of the ZnO UV peak after the Graphene conjugation

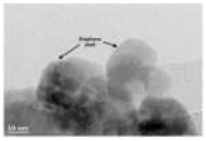


Electroluminescence of Hybrid LED device



XRD and HR TEM





Chemical exfoliation of pure graphene sheets from synthesized ZnO-graphene quasi core-shell quantum dots

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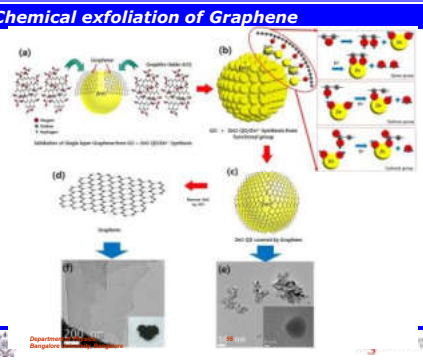
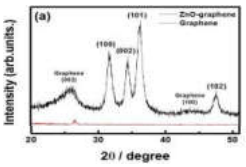
Chemical exfoliation of pure graphene sheets from synthesized ZnO–graphene quasi core–shell quantum dots

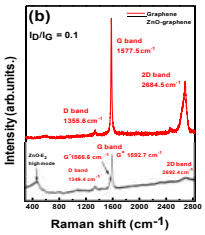
Dong Ick Son [a], Byoung Wook Kwon [b], Hong-Hee Kim [b], Dong Hee Park [b], Basavaraj Angadi [c], Won Kook Choi [b,*]

Chemical exfoliation of Graphene

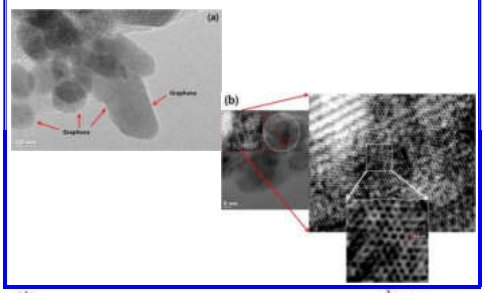


XRD and the Raman spectra

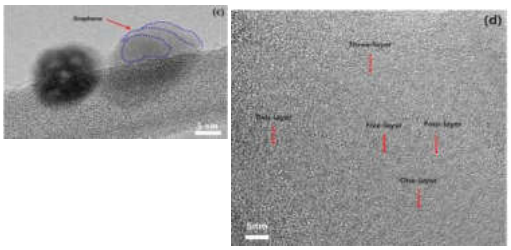




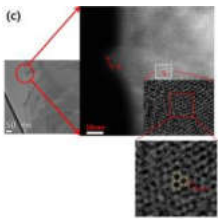
HR TEM of Graphene



HR TEM showing 1 to 5 layers of Graphene

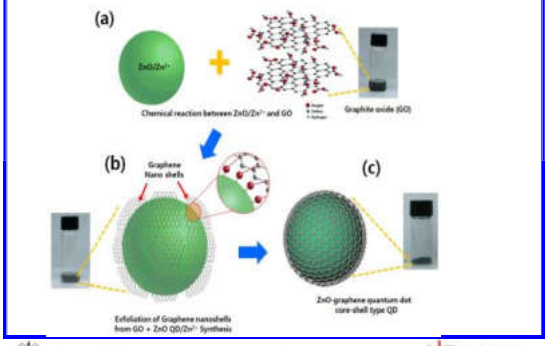


HR TEM showing the hexagonal arrangement of carbon atoms in Graphene

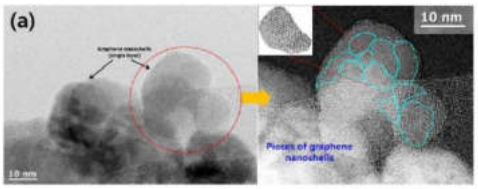


Charge Separation and Ultraviolet Photovoltaic Conversion of ZnO Quantum Dots Conjugated with Graphene Nanoshells

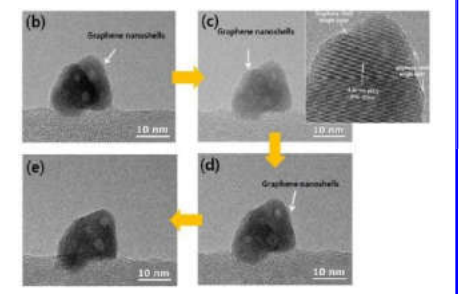
Synthesis of ZnO – Graphene QDs

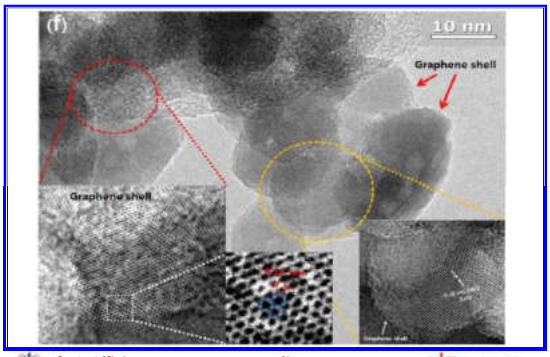


Synthesis of ZnO – Graphene QDs



High Resolution TEM images of QDs

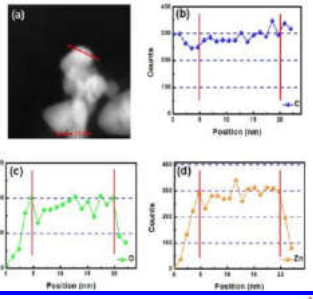




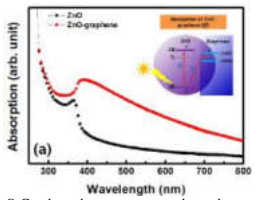
HR-HAADF image and EDS

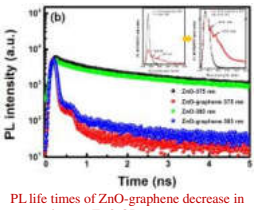
High resolution high angle annular dark field (HR-HAADF) image

Energy-dispersive X-ray spectroscopy (EDS) profiles



UV-visible absorption spectra and Time-resolved PL of the ZnO-graphene QDs





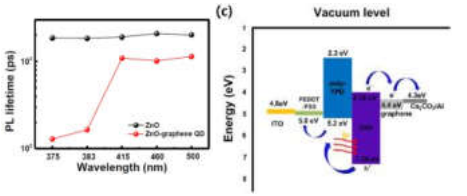
ZnO-Graphene demonstrates an enhanced absorption peak at longer wavelengths

Extends the working wavelength window of the PV device

PL life times of ZnO-graphene decrease in comparison to ZnO QDs

Due to charge transfer from the ZnO QD to graphene nanoshells

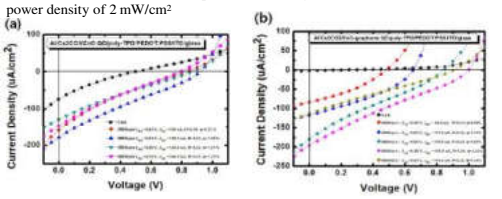
Calculated PL Life time and Band structure of UV Photovoltaic device



The device structure was fabricated using simple spin coating technique on ITO

UV Photovoltaic characteristics of the device

UV source : ultraviolet (UV) lamp with a wavelength of 365 nm and power density of 2 mW/cm²



Best performance for the device with 4000 rpm

The V_{oc}, J_{sc}, and fill factor (FF) were 0.91 V, 178.3 μA/cm², and 0.23, respectively, and the corresponding PCE was approximately 1.86%.

Best performance for the device with 5000 rpm and

The V_{oc}, J_{sc}, FF, and PCE were 0.99 V, 196.4 μA/cm², 0.24, and 2.33%, respectively.

Journal of Materials Chemistry
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Cite this: J. Mater. Chem., 2012, 22, 816
www.rsc.org/materials
COMMUNICATION

High efficiency ultraviolet photovoltaic cells based on ZnO–C_{60} core–shell QDs with organic–inorganic multilayer structure

Dong Ick Son,[a] Byoung Wook Kwon,[a] Jeong Do Yang,[a] Dong Hee Park,[a] Basavaraj Angadi[b] and Won Kook Choi[*a]

Synthesis of ZnO – Graphene QDs

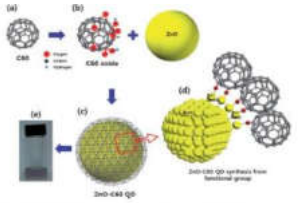
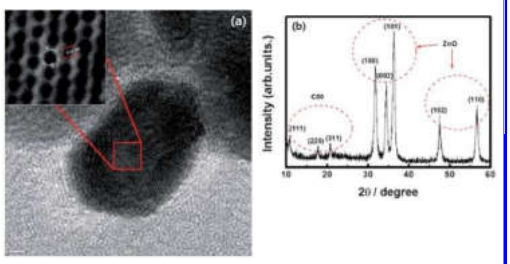


Fig. 1 The schematics of conceptual chemical synthesis of ZnO-C_{60} core–shell QDs. (a) Induced functional groups on the C_{60} oxide surface after treatment with an acid of H_2SO_4 : HNO_3 = 3 : 1. (b) Embryo ZnO QDs formed under the chemical reaction and formation of the ZnO-C_{60} core–shell QDs. (c) Schematics of the ZnO-C_{60} core–shell QDs. (d) The possible chemical reactions between three kinds of functional groups (carboxyl (-COOH), hydroxy (-OH), and epoxy) and C_{60} oxide. (e) Image of the ZnO-C_{60} QDs in DMF solution.

High Resolution TEM images of QDs



PL and Band diagram showing the charge transfer

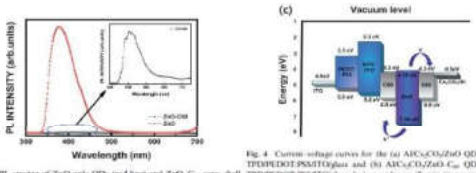


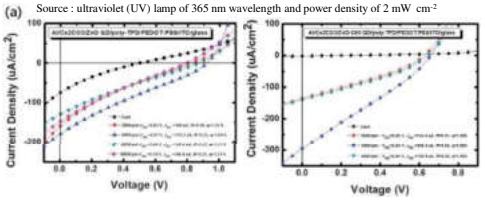
Fig. 3 PL spectra of ZnO only QDs (red line) and ZnO-C_{60} core–shell QDs (black line). The inset shows the magnified PL spectrum of ZnO-C_{60} core–shell QDs.

Fig. 4 Current–voltage curves for the (a) AlC_8CO_2/ZnO QDs/poly TPD/PEDOT:PSS/ITO/glass and (b) AlC_8CO_2/ZnO-C_{60} QDs/poly TPD/PEDOT:PSS/ITO/glass devices under an illumination wavelength of 365 nm. (c) Energy diagram showing the charge transfer process in the PV device.

PL quenching of the ZnO UV peak after the C60 conjugation showing the efficient charge transfer from ZnO to C60

UV Photovoltaic characteristics of the device

(a) Source : ultraviolet (UV) lamp of 365 nm wavelength and power density of 2 mW cm^{-2}



Best performance for the device with 4000 rpm

The V_{oc}, J_{sc}, and fill factor (FF) were 0.91 V, 178.3 μA/cm^2, and 0.23, respectively, and the corresponding PCE was approximately 1.86%.

Best performance for the device with 3000 rpm

The V_{oc} J $_{s}$FF and PCE were 0.64 V,295.2 mA cm2, 0.32 and 3.02%., respectively

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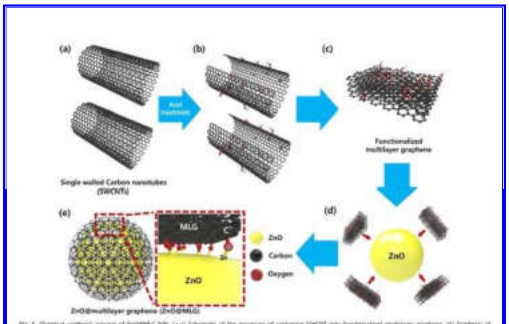
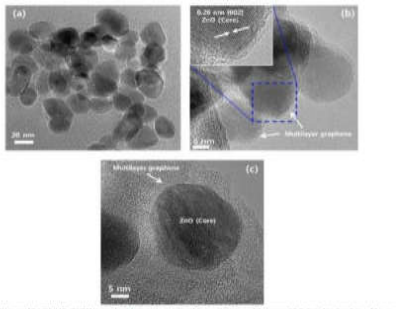
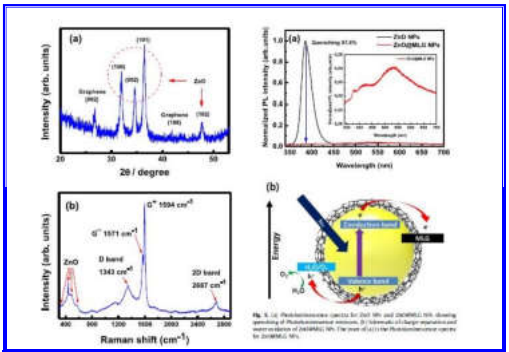
journal homepage: www.elsevier.com/locate/nanoen

A facile chemical synthesis of ZnO@multilayer graphene nanoparticles with fast charge separation and enhanced performance for application in solar energy conversion

Jaeho Shim [a,b,1], Jung Kyu Kim [c,d,1], Kyu Seung Lee [a], Chang-Lyoul Lee [e], Ming Ma [d], Won Kook Choi [c,f], Jun Yeon Hwang [a], Hee Yeon Yang [a], Basavaraj Angadi [b], Jong Hyeok Park [d,g], Kyoungsik Yu [h,**], Dong Ick Son [a,i,*]







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Highly Dispersible Buckled Nanospring Carbon Nanotubes for Polymer Nano Composites

Y. J. Lee[1,2], S. R. Ham[1,2], J. H. Kim[1,2], T. H. Yoo[1], S. R. Kim[1], Y. T. Lee[1], D. K Hwang[1,2], B. Angadi[1], W. S. Seo[3], B. K. Ju[3] & W. K. Choi[1,2]

We propose the unique structure of highly dispersible single-walled carbon nanotubes (SWCNTs) in various solvents and polymers using the ZnO nano particle template. Buckled nanospring-shaped carbon nanotubes (NS-CNTs) were synthesized by a chemical reaction of ZnO nanoparticles with acid-treated SWCNTs and then dissolving ZnO through chemical etching. The unique structure of distorted hexagonal NS-CNTs encircled around ZnO nanoparticles was formed by the bending of SWCNTs caused by the agglomeration of chemically adsorbed $Zn(OH)_2$, which is further crystallized as the polycrystalline ZnO inner core. The highly dispersible NS-CNTs could be incorporated in the poly[(vinylidenefluoride-co-trifluoroethylene) [P(VDF-TrFE)] copolymer, one of widely studied ferro- and piezo-electric polymer, up to the value of 15 wt% as nanofillers. The relative dielectric constant (ε) of polymer nanocomposite, at 1 kHz, was greatly enhanced from 12.7 to the value of 62.5 at 11 wt% of NS-CNTs, corresponding to a 492% increase compared to that of pristine P(VDF-TrFE) with only a small dielectric loss tangent (D) of 0.1.

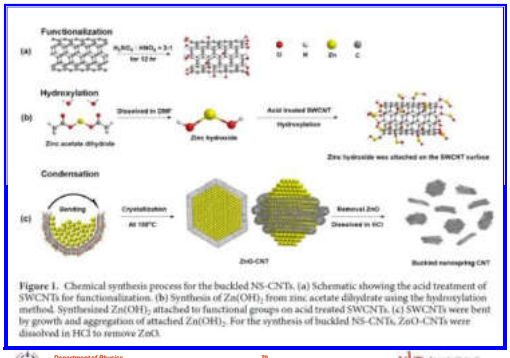

Figure 1. Chemical synthesis process for the buckled NS-CNTs. (a) Schematic showing the acid treatment of SWCNTs for functionalization. (b) Synthesis of $Zn(OH)_2$ from zinc acetate dihydrate using the hydroxylation method. Synthesized $Zn(OH)_2$ attached to functional groups on acid treated SWCNTs. (c) SWCNTs were bent by growth and aggregation of attached $Zn(OH)_2$. For the synthesis of buckled NS-CNTs, ZnO-CNTs were dissolved in HCl to remove ZnO.

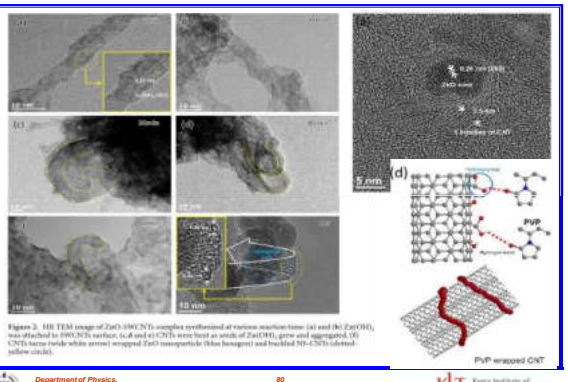

Figure 2. HR TEM image of ZnO–SWCNTs complex synthesized at various reaction time: (a) and (b) $Zn(OH)_2$ was attached to SWCNTs surface, (c,d) and (e) CNTs were bent as seeds of $Zn(OH)_2$ grew and aggregated. (f) CNTs facets (wide white arrow) wrapped ZnO nanoparticle (blue hexagon) and buckled NS-CNTs (dotted-yellow circle).

Materials Horizons

ROYAL SOCIETY OF CHEMISTRY

COMMUNICATION

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Direct conjugation with a zero length linker of fullerene C_{70} to ZnO quantum dots for multicolor light-emitting diodes†

Young Jae Park,‡[a] Jaeho Shim,‡[a] Kyu Seung Lee,‡[a] Won Ki Lee,[a] Jun Yeon Hwang,[a] Hyunbok Lee,[a] Yeonjin Yi,[b] Basavaraj Angadi,[a] Won Kook Choi[a] and Dong Ick Son[a]

ACS Photonics

Article

Realization of Excitation Wavelength Independent Blue Emission of ZnO Quantum Dots with Intrinsic Defects

Hong Hee Kim, Yeonju Lee, Yun Jae Lee, Junkyeong Jeong, Yeonjin Yi, Cheolmin Park, Sang-Youp Yim, Basavaraj Angadi, Keumjin Ko, Jae-Wook Kang, and Won Kook Choi

ACS Photonics, Just Accepted Manuscript • DOI: 10.1021/acsphotonics.9b01587 • Publication Date (Web): 12 Feb 2020

Summary

- What is a nanomaterial and its size dependent properties
- what is graphene and its extraordinary properties and applications
- Demonstrated a novel, simple and facile technique for synthesizing ZnO–graphene quasi-core–shell structure quantum dots using a simple chemical method
- Exhaustive characterization was done through HR-TEM, PL, XRD, and EL
- Demonstrated a white light emitting diode (LED) through EL
- Demonstrated the UV photovoltaic cell and studied the performance
- Demonstrated the UV photovoltaic cell and studied the performance

Acknowledgements

- **Dr. Won-Kook Choi, ---- Team Leader**
  Dr. Dong Ick Son
  Dr. Dong-Hee Park
  Dr. Ji-Won Choi
  Mr. Byoung Wook Kwon

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Acknowledgements

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  Dr. Dong-Hee Park
  Dr. Ji-Won Choi
  Mr. Byoung Wook Kwon

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- **Dr. Yeonjin Ye**

Institute of Physics and Appleied Physi
Yonesie University, Seoul, Korea

Taken from WebQuest Nanoscience in Nature by Jeanne Nye

Session – II: By Dr. Shanmukhappa B Kaginelli. Asso. Professor,Division of Medical Physics,Faculty of Life Sciences,JSS Academy of Higher Education &Research,Mysore.

Radiation Applications & Future....

Dr. Shanmukhappa B Kaginelli
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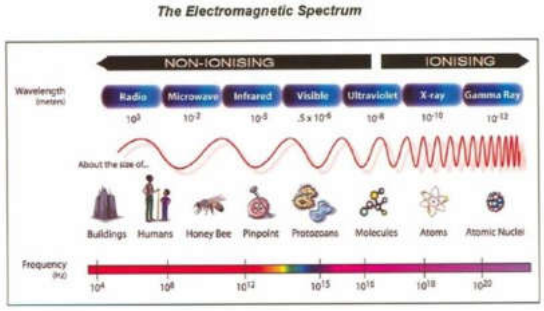
Associate Professor
Division of Medical Physics,
Faculty of Life Sciences,
JSS AHER (University), MYSURU.
9902244859

Radiation and its Types



Radiation and its Types

- **Radiation:** Radiation is nothing but Energy in motion
  We live in a sea of radiation. This includes,

Non-Ionizing Radiation: Radiation that does not have sufficient energy to remove an electron (ionize) from an atom.

e.g.: Radio waves, microwaves, infrared radiation , visible light, lasers, ultraviolet light and radar.

- **Ionizing Radiation**: Radiation that has sufficient energy to eject electrons from atoms (i.e. ionize atoms). e.g.: Alpha Particle, Beta Particles, Neutrons, Gamma & X-Rays

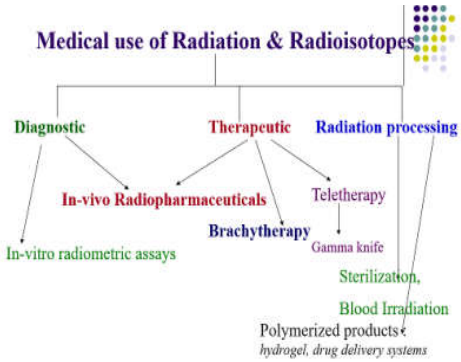
Why are elements radioactive?

Unstable nucleus:
Has excess energy.
Wants to go to "ground state."
Becomes stable by emitting ionizing radiation

Bhabha Atomic Research Centre, Trombay

Application of Ionizing Radiations

- **Medical**
  Diagnostic, Therapeutic, Sterilization
- **Agriculture**
  Food preservation, Tracers, Mutation
- **Industry & Hydrology**
  Radiography(NTD) , Tracers, Gauging, Radiation Processing
- **Research**
  Tracers ...



Radiation Therapy

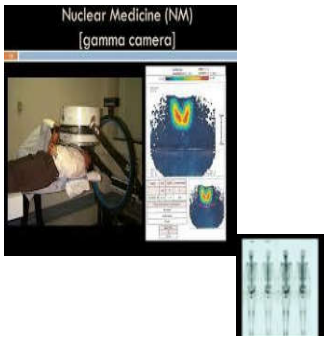
- is used for cancer and for blood disorders such as leukemia. Formerly it was used for overactive thyroids, acne, and benign tumors, but complications with more severe skin diseases and radiation- induced cancers caused almost complete abandonment of these
- Co-60, Ir-192, Isotopes are in Radiotherapy (Teletherapy & Brachytherapy)
- "*Radiation can Cure & can Create the Cancer*"

Radiotherapy Equipment's

Nuclear Medicine

Diagnostic Procedures

- Short half-life radioactive injection
- Pictures taken with special gamma camera
- Many different studies:
  - Thyroid
  - Lung
  - Cardiac
  - White Blood Cell



Some Radioisotopes Used in Nuclear Medicine

Isotope	Half-Life	Medical Application
Ce-141	32.5 days	Gastrointestinal tract diagnosis; measuring blood flow to the heart
Ga-67	78 hr	Abdominal imaging; tumor detection
Ga-68	68 min	Detect pancreatic cancer
P-32	4.3 days	Treatment of leukemia, excess red blood cells, pancreatic cancer
I-125	60 days	Treatment of brain cancer; osteoporosis detection
I-131	8 days	Imaging thyroid; treatment of Graves' disease, goiter, and hyperthyroidism; treatment of thyroid and prostate cancer
Sr-85	65 days	Detection of bone lesions; brain scans
Tc-99m	6 hr	Imaging of skeleton and heart muscle, brain, liver, heart, lungs, bone, spleen, kidney, and thyroid; *most widely used radioisotope in nuclear medicine*

Diagnostic Radiology

- Is concerned with the use of various imaging modalities to aid in the diagnosis of disease.
- can be further divided into multiple sub-specialty areas. Interventional radiology, one of these sub-specialty areas, uses the imaging modalities of diagnostic radiology to

Diagnostic Radiology Equipment's

Medical Radiation Facilities in India

- **Radiotherapy centres : 410**
- **X-ray diagnostic equipment: 45,200**
  - (Computed Tomography- 2339
    Interventional Radiology – 985)
- **Nuclear Medicine Centres – 236**
  - (PET-CT – 125 , Gamma Camera – 163)

APPLICATION OF RADIOISOTOPES IN INDUSTRY AND AGRICULTURE

- The use of radioisotopes in industry ensures good quality products and brings down the cost of manufacture by ways of sensitive non-destructive testing (NDT) and efficient in-process control.
- Industrial applications of radioisotopes and radiation can be broadly classified into three categories:

Industrial Radigraphy (NDT)

Food & Food Product Irradiation

Food irradiation is the process by which foods (such as fruits vegetables, spices and meats) is exposed to ionizing radiation to destroy microorganisms, bacteria, viruses, or insects that might be present in the food.

• It is the physical treatment that consists of exposing foods either pre packaged or in bulk to the direct action of electronic, electromagnetic rays.

• When made to bombard against materials, they can knock off an electron from an atom or molecule causing ionization. For this reason, these are often called ionizing irradiation.

• Food Irradiation is a form of food preservation that prolong shelf life, ***improve microbiologic safety***, and reduce the use of chemical fumigants and additives.

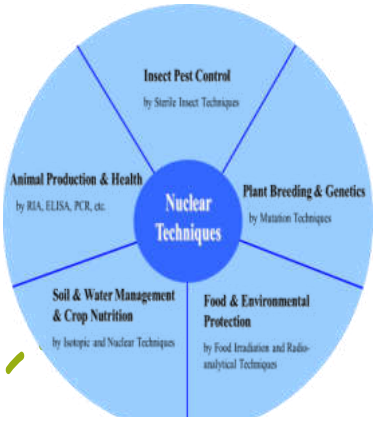
Food Irradiation Uses…

- Reduce insect infestation -grain, spices, fruits and vegetables.
- Inhibit sprouting -tubers and bulbs.
- Retard ripening –fruits.
- Inactivate parasites -meats and fish.
- Eliminate spoilage microbes -fruits, vegitables
- Extend shelf life -poultry, meat, fish, shellfish.
- Decontaminate -poultry and meat.
- Sterilize foods and feeds.
  - ***"Irradiation increases the number of free radicals in the food and decreases the antioxidant vitamins that neutralize them."***

Why we irradiate foods?

- **Irradiation prevents food poisoning by killing pathogenic bacteria such as *E.coli:0157(beef),Campylobacter*, *Salmonella*,(poultry) *Clostridium perfringens.***
- **It control insects and parasite infestation.**
- **It reduce spoilage by destroying molds, bacteria and yeast.**
- **Increases shelf life by slowing ripening of fruits and vegetables and inhibit sprouting.**
- Irradiation causes microbial death by inhibiting DNA synthesis .
- Other mechanisms involved in irradiation of microbial inactivation are cell membrane alteration, de-naturation of enzymes, alterations in ribo-nucleic acid(RNA)synthesis, effects on phospho-rylation, and DNA compositional changes.

Application in Food and Agriculture....



Radiation Sterilization of Surgical Product...

- Radiation is the only way which it can penetrate into the instrument
- It also can kills germs or any microbial life in the instruments.
- If we use other ways(heating, filtering etc.) it only kills microbial life on the surface only
- Safe
- Cheaper
- Eco-friendly

Food & Medical Product Irradiation Facility.....

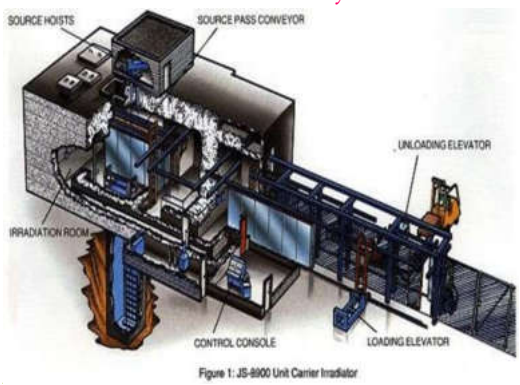
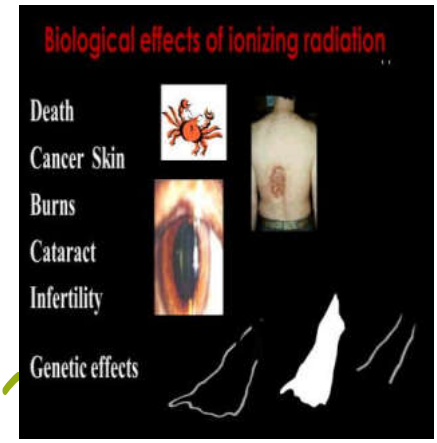


Figure 1: JS-8900 Unit Carrier Irradiator

Food Irradiation Facilities.....

Carbon Dating

- During an organism's life, $^{14}CO_2$ and $^{12}CO_2$ are in a dynamic equilibrium at a ratio of 1 part in 10^{12}.
- When an organism dies, the $^{14}C/^{12}C$ ratio decreases as ^{14}C undergoes β decay to ^{14}N.
- Measuring the $^{14}C/^{12}C$ ratio determines the age of the sample with a high degree of certainty.
- Ages of 1000–20,000 years are commonly determined. The half-life for ^{14}C is 5730 years.



The age of the earth

- U-238 decays eventually to Pb-206
- Since half-life of U-238 is much longer (4.5 billion years) than the intermediates, Pb-206 appears almost instantly after its decay
- If the mineral was once pure U-238, after some billions of years it becomes a mixture of U and Pb only
- Measuring the ratio of Pb:U gives us the age of the rock
- Note that the U-238 half-life is of the order of the age of the earth. If the earth was 6,000 years old or 50 billion years old, it would not work.

Atomic Energy Regulatory Board, Mumbai (AERB)

"Licence in accordance with Atomic Energy (Radiation Protection)Rules, 2004 from AERB is mandatory requirement for the procurement and use of radiation sources in India".

Thank U

Thank U

List of the Registered participants Attending the Webinar on Recent Advances in Nano Science and Radiation Physics, Conducted on 12 June 2020

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19	11/06/2020 17:58	farhanapsk@gmail.com	Dr. FARHANA PARVEEN	Govt. College (Autonomous),Kalaburgi	Dept. Of Physics	Asst. Prof. Of Physics	Female	9964605458
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23	11/06/2020 19:08	santoshkumarpawarglb@gmail.com	SANTOSH PAWAR	MUKTAMBIKA PU SCIENCE COLLEGE KALABURAGI	PHYSICS	LECTURER	Male	7676556982
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32	12/06/2020 9:59	daneshwari.soddy@gmail.com	DANESHWARI SODDY	Mutkambika PU Science college for girls	Physics	Lecturer	Female	7204985702
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37	12/06/2020 10:14	ranoji12shikkargol@gmail.com	Dr RK SHIKKARGOL	Sharanabasaveshwar College of Science , Kalaburagi	Chemistry	Associate professor	Male	9900534651
38	12/06/2020 10:15	arunmane527@gmail.com	ARUNKUMAR	Sharnbasva university kalaburagi	M.sc physics	Faculty	Male	8971362527
39	12/06/2020 10:16	sandhyasalgar19376@gmail.com	SANDHYA SALGAR	Sharanbasva University	Faculty of science and technology	Gulbarga	Female	8105805249
40	12/06/2020 10:25	brunda.h03@gmail.com	BRUNDA HIREMATH	Sharanbasveshwar college of science, Kalaburagi	Physics	Student	Female	8951907792
41	12/06/2020 10:46	ankaranam@gmail.com	Karanam Ajith Narayana Rao	VIJAYANAGARA COLLEGE HOSAPETE	Physics	Asst.Professor	Male	9.19986E+11
42	12/06/2020 10:54	eshupatil1998@gmail.com	ESHWARI B PATIL	Sharanbasav University kalburgi	MSc (Physics)	Shahabad	Female	8971811054
43	12/06/2020 10:56	jagadevigudda@gmail.com	Dr. Jagadevi C Gudda	Sharnbasveshwar college of science Kalaburagi	Electronics	Assistant professor	Female	9481171872
44	12/06/2020 10:56	manjusaw@gmail.com	Dr. Manjunath A	Govt PU College for Girls Aland Gulbarga	Physics	Lecturer	Male	9739124106
45	12/06/2020 10:56	vivekhodal4222@gmail.com	VIVEKANAND	Sharnbasva University Kalaburagi	MSc. Physics	Student	Male	7483112797
46	12/06/2020 11:06	rekha.j.shellagi@gmail.com	REKHA.M.HEROOR	Sharanbasava university	Physics	Assistant professor	Female	8880321768
47	12/06/2020 11:08	renukaheroor46@gmail.com	Renuka.M.Heroor	Muktambika Pu science college.gulbarga	Physics	Lecturer in physics	Female	8073789743
48	12/06/2020 11:08	rajeshwari.phy@gmail.com	T Rajeshwari	KLE'S GH COLLEGE HAVERI	Physics	Assistant professor	Female	9972704083
49	12/06/2020 11:14	ambreshreddy5@gmail.com	AMBRESH REDDY	Sharnbasva university kalaburagi	Chemistry	Assistant professor	Male	9900644473

50	12/06/2020 11:14	avinashp@vskub.ac.in	Dr. Avinash Pandurang	Vijayanagara Sri Krishnadevaraya University, Ballari, Karnataka	Department of studies in Physics	Assistant Professor	Male	9538188146
51	12/06/2020 11:17	imtiyazmubeen@gmail.com	IMTIYAZ AHMED MUBEEN M	THE NATIONAL COLLEGE BAGEPALLI , CHICKABALLAPUR DISTRICT.	PHYSICS	ASSOCIATE PROFESSOR	Male	9901557992
52	12/06/2020 11:17	rajeshwari.phy@gmail.com	T Rajeshwari	KLE'S GH COLLEGE HAVERI	9972704083	Assistant professor	Female	9972704083
53	12/06/2020 11:18	kantheshmb@jssuni.edu.in	Kanthesh M Basalingappa	JSS AHER, Mysuru	Molecular Biology	Assistant Professor	Male	9482046281
54	12/06/2020 11:21	rekha.j.shellagi@gmail.com	REKHA.M.HEROOR	Sharanbasava university	Physics	Assistant Professor	Female	8880321768
55	12/06/2020 11:23	arunkhosadoddi143@gmail.com	ARUN	Sharnbasva university kalaburagi	Physics	Student	Male	8277000116
56	12/06/2020 11:24	Sulochana.devar7@gmail.com	Sulochana devar	Gulbarga university kalburagi	Physics department	Research scholar	Female	8722139595
57	12/06/2020 11:43	basavarajreddy3@gmail.com	BASAVARAJA	SPOORTI PU SCIENCE COLLEGE AFZLPUR	PHYSICS	LECTURER	Male	9741325144
58	12/06/2020 11:47	rekha.j.shellagi@gmail.com	REKHA.M.HEROOR	Sharanbasava university	Physics	Assistant Professor	Female	8880321768
59	12/06/2020 12:33	shanjrutk@jssuni.edu.in	SHANKRAMMA K	JSS AHER, Mysore	Department of Water and Heath, School of Life Science	Assistant professor	Female	9945877182
60	12/06/2020 14:01	pattarrajmohan@gmail.com	Dr. Mohanraj N. Pattar	Smt. Veeramma Gangasiri Degree College & PG Centre for Women, Kalaburagi	Physics	Assistant Professor	Male	8748033330
61	13/06/2020 3:39	manjunathskore@gmail.com	MANJUNATH	sb science college kalaburagi	mathematics	Lecturer	Male	8050184818
62	15/06/2020 16:41	shantlingcd@gmail.com	SHANTLING CHANDRAPPA DHABALE	Shree Basaveshwar First Grade College Of Science Basavakalyan Dist Bidar	Physics	Lecturer	Male	9920091826


Zoom Meeting 40-Minutes
HP
MOHAN PANDU...
Ashwini Apparao
Dr. Ompraka...
Veenashri Chan...
MAHENDRA A C
Sannnabasanagouda Dollegoudar
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Participants
Chat
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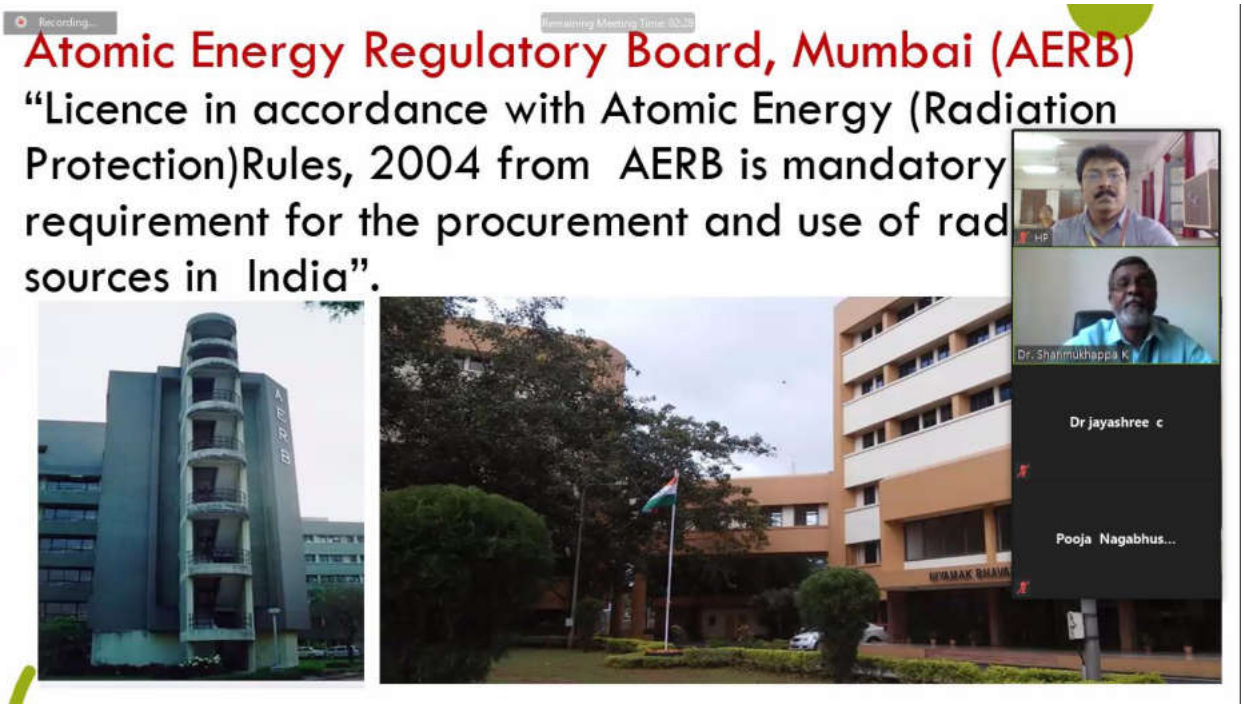
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Atomic Energy Regulatory Board, Mumbai (AERB)
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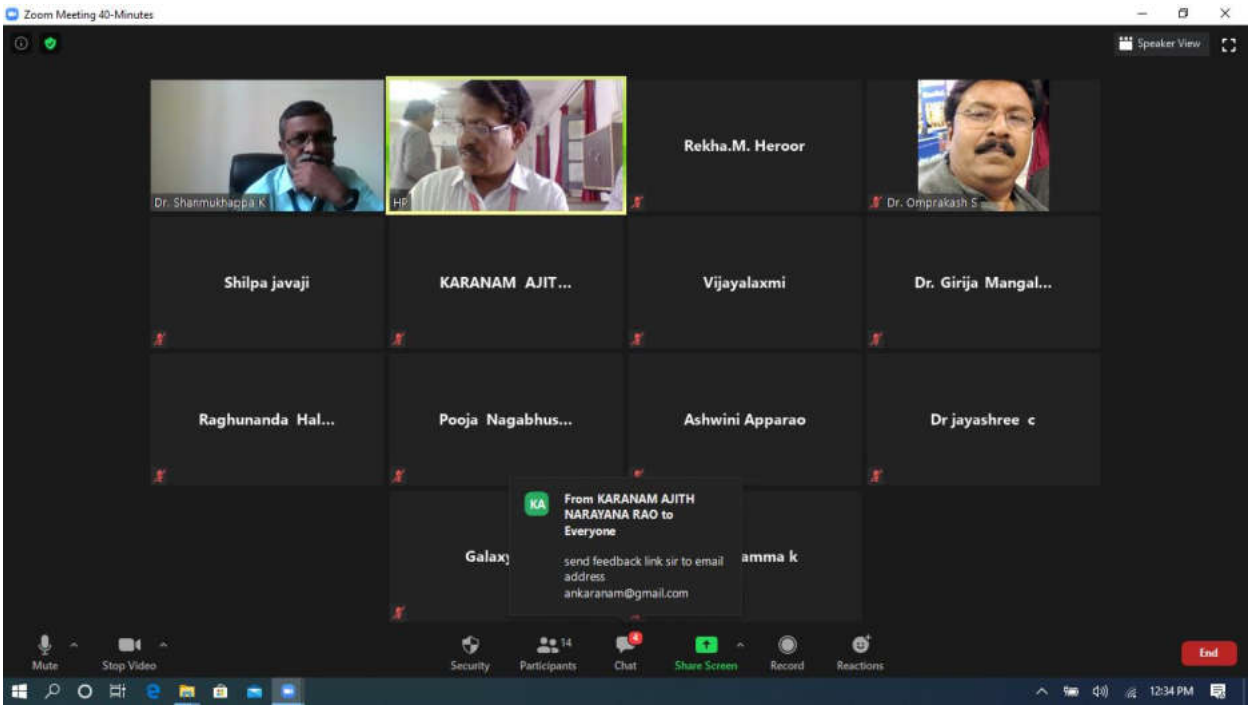
HP
Dr. Sharmukhappa K
Dr jayashree c
Pooja Nagabhus...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Speaker View
Dr. Shanmukhappa K
HP
Rekha.M. Heroor
Dr. Omprakash S
Shilpa javaji
KARANAM AJIT...
Vijayalaxmi
Dr. Girija Mangal...
Raghunanda Hal...
Pooja Nagabhus...
Ashwini Apparao
Dr jayashree c
From KARANAM AJITH NARAYANA RAO to Everyone
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Chat
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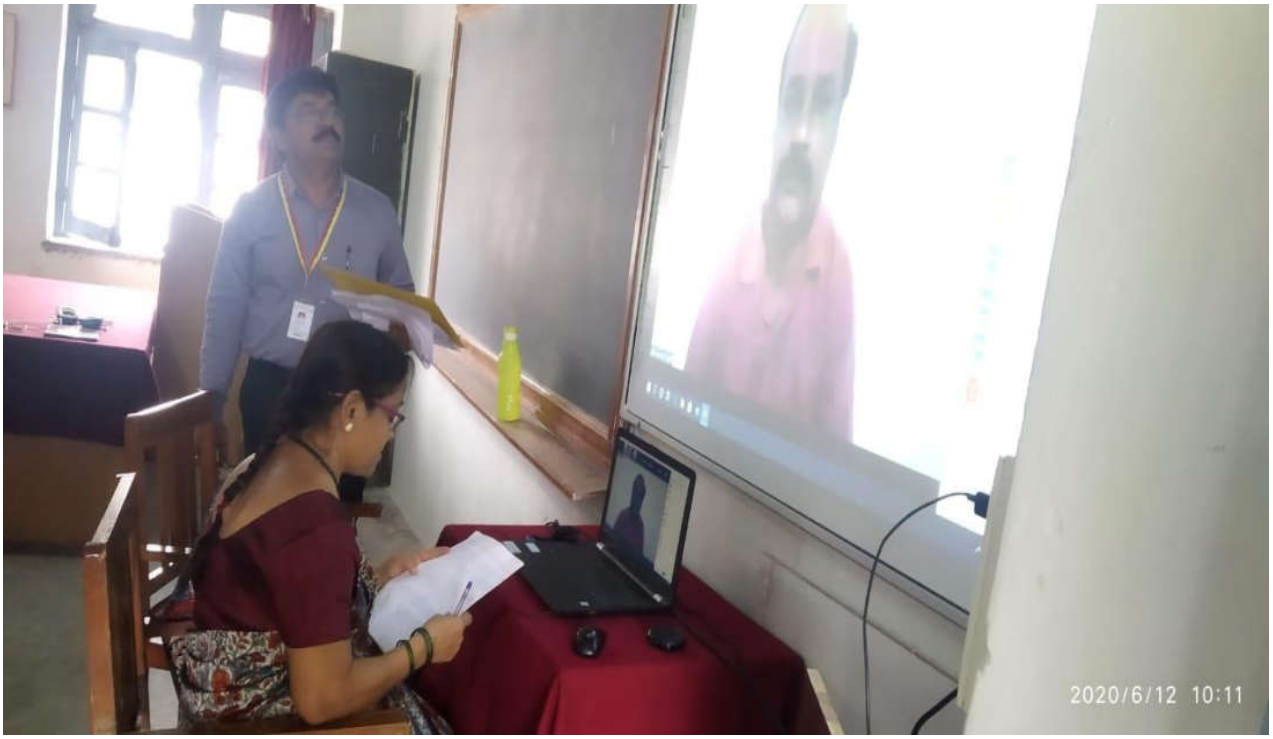
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Centenary Celebrated Sharanabasaveshwar Vidya Vardhak Sagha's

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Kalaburagi - 585 103, Karnataka

Department of Physics

One Day National Webinar

on

Recent Advances In Nano Science & Radiation Physics

Certificate

This is to certify that Dr./Prof./Mr./Ms.....

of.....has worked

*as a **Resource Person** in One Day National Webinar on **Recemt Advances In Nano Science & Radiation Physics** under IQAC initiative & organized by Department of Physics on 12th June 2020 at Sharanabasveshwar College of Science, Kalaburagi, Karanatka.*

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Organizing Secretary

Dr. Omprakash S.
IQAC Coordinator & Organizing Secretary

Dr. T. V. Biradar
Academic Activities Coordinator

PRINCIPAL
(Dr. S.G. Dollegoudar)

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*has **participated** in One Day National Webinar on **Recemt Advances In Nano Science & Radiation Physics** under IQAC initiative & organized by Department of Physics on 12th June 2020 at Sharanabasveshwar College of Science, Kalaburagi, Karanatka.*

Dr. Chitralekha Alur
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PRINCIPAL
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