



University Faculty Details Page on DU Web-site

Title	DR.	First Name	BINAY	Last Name	Kumar	Photograph
Designation		Associate Professor				
Department		Physics & Astrophysics				
Address (Campus)		Crystal Lab, Department of Physics & Astrophysics, University of Delhi, Delhi-110007				
(Residence)		D-19, 29/31 Probyn Road, University of Delhi, Delhi-110007				
Phone No (Campus)		+91-11-27662289				
(Residence) optional		+91-11-27662026				
Mobile		+91-9818168001				
Fax		+91-11-27667061 (HOD)				
Email		bkumar@physics.du.ac.in , b3kumar69@yahoo.co.in				
Education						
Subject	Institution	Year	Details			
Ph.D.	University of Delhi	1992	Thesis topic: Polytypism of vapour grown dendritic single crystals of both undoped and doped cadmium iodide			
PG	M.Sc., Bhagalpur University	1986	Subjects: Physics			
UG	B.Sc. (H), Bhagalpur University	1983	Subjects: Physics, Chemistry Mathematics			
Career Profile						
Organization / Institution	Designation	Duration	Role			
University of Delhi	Associate Professor	1 Jan 2006-Till date	Teaching & Research			
University of Delhi	Reader	June 2001-Dec 2005	Teaching & Research			
University of Delhi	Lecturer (& Senior Sc)	Jan1993-June 2001	Teaching & Research			
University of Delhi	Research Associate	Aug.1992-Jan 1993	Teaching & Research			

Research Interests / Specialization

In the Crystal Lab, we are working for the growth of single crystals of technologically important materials like high performance piezoelectric (e.g. PZNT, LN, Lead –free materials, etc.), high T_c superconductors (e.g. Bi-2212 system), ZnO nano structure, MX_2 compounds, Organic & Semi-organic NLO materials and their characterization. Enhancement of crystallographic and material properties by various pre- and post- growth treatments and doping to make these crystals more suitable for application is one of the targets of our research work. Single crystals are grown by flux, Cz, solution, vapor, zone traveling etc. techniques while the characterization include techniques like XRD, SEM, TEM, AFM, TGA, Dielectric (conductivity, etc,) Piezometry (d_{33}), Ferroelectric (P-E loop, etc), UV-Vis, FTIR etc, etc..

Teaching Experience (Subjects/Courses Taught)

1992-present: Atomic & Molecular Physics, Electronics (Core papers, M.Sc. (F) and (P))

Advanced Solid State Physics Expt Lab (M.Sc. Final)

Solid State Physics Lab, Waves & Optics Lab (M.Sc. Previous)

Honors & Awards

RECENT PUBLICATIONS (2009-June 2011 Only)

In Indexed/ Peer Reviewed Journals

<u>Year of Publication</u>	<u>Title</u>	<u>Journal</u>	<u>Co-Author</u>
(24) 2011	'High T_c Ferroelectricity in V-Doped ZnO'	J. Mater. Chem.(In Press) , DOI:10.1039/C1JM12107C	Manoj K. Gupta
(23) 2011	Enhancement in dielectric and ferroelectric properties of lead free $Bi_{0.5}(Na_{0.5}K_{0.5})_{0.5}TiO_3$ ceramics by Sb-doping	Ceramic International (In Press) doi:10.1016/j.ceramint.2011.04.013.	Krishan Kumar, B. K. Singh, M. K. Gupta, N. Sinha
(22) 2011	Effect of zinc chloride on structural, optical and dielectric behavior of solution grown anthracene crystal	Physica B 406 (2011) 3206–3209.	Nidhi Sinha, Manoj K.Gupta , Neeti Goel

(21) 2011	p- type K -doped ZnO Nanorods for opto-electronic applications	Journal of Applied Physics 109, 083532 (2011).	Manoj K. Gupta, Nidhi Sinha
(20) 2011	Enhanced ferroelectric, dielectric and optical behaviour in Li-doped ZnO nanorods.	Journal of Alloys and Compound 509 (2011) L208–L212.	Manoj K. Gupta
(18) 2011	Structural, optical and dielectric studies of Glycinium trifluoroacetate single crystal.	Physica B: Condensed Matter, 406 (2011) 2152–2157.	Neelam Singh
(18) 2011	Investigation of glassy behaviour of flux grown $\text{Pb}[(\text{Zn}_{1/3}\text{Nb}_{2/3})_{0.91}\text{Ti}_{0.09}]\text{O}_3$ crystal.	Physica B: Condensed Matter, 406 (2011) 941–945.	B.K. Singh
(17) 2011	Enhancement in crystalline perfection and optical properties of benzophenone single crystals: the remarkable effect of a liquid crystal	J. Appl. Cryst. (2011). 44, 839–845	S. K. Kushwaha, N. Vijayan, K. K. Maurya, A. Kumar, K. Somayajulu and G. Bhagavannarayana
(16) 2011	Growth and characterization of new semi organic L-proline strontium chloride monohydrate single crystals.	Physica B: Condensed Matter 406 (2011) 63.	Manoj K. Gupta, Nidhi Sinha
(15) 2010	Effect of electric field on dielectric, ac conduction and ferroelectric behavior of flux-grown $\text{Pb}[(\text{Zn}_{1/3}\text{Nb}_{2/3})_{0.91}\text{Ti}_{0.09}]\text{O}_3$ single crystals.	Phys. Status Solidi A, 1–7 (2010) / DOI 10.1002/pssa. 200925643.doc.	B. K. Singh, K. Kumar, M. K. Gupta
(14) 2010	Synthesis of K-doped p-type ZnO nanorods along (100) for ferroelectric and dielectric applications.	Materials Letters, 64 (2010)1825-28.	Manoj K Gupta, Nidhi Sinha, B.K. Singh.

(13) 2010	Structural, Dielectric, Optical and Ferroelectric property of Urea Succinic Acid Crystals grown in aqueous solution containing Maleic Acid.	Journal of Physics and Chemistry of Solids 71(2010) 1774–1779.	B. K. Singh, N. Sinha, N. Singh, K. Kumr, M. K. Gupta
(12) 2010	Impedance analysis and high temperature conduction mechanism of flux grown $Pb[(Zn_{1/3}Nb_{2/3})_{0.91}Ti_{0.09}]O_3$ single crystal.	Cryst. Res. Technol. 45, 1003 – 1011 (2010)	B. K. Singh
(11) 2010	Synthesis and Comparative Study of ZnO Nanorods for Structural, Optical and Dielectric Behaviour.	Integrated Ferroelectrics, 118:61–66, 2010.	M.K. Gupta, Nidhi Sinha
(10) 2010	Organic Ferroelectrics: A Big Surprise.	Nature Asia Materials Research Highlight, doi: 10.1038/asiamat.2010.48, (2010).	Mohd. Shakir, B.K.Singh, G. Bhagavannarayana,
(9) 2010	Synthesis and characterization of Sb-doped $Bi_{0.5}(Na_{0.5}K_{0.5})_{0.5}TiO_3$ ceramic.	Integrated Ferroelectrics, 121:99–105, 2010.	Krishan Kumar
(8) 2010	Growth of 1 0 0 directed ADP crystal with slotted ampoule.	Current Applied Physics 10 (2010) 1221-1226.	P. Rajesh, P. Ramasamy, G. Bhagavannarayana.
(7) 2010	“Effect of ion irradiation on the m-Nitroaniline single crystals”.	Nucl. Instr. and Meth. in Phys. Res. B 268 (2010) 36–41.	T. Kanagasekaran, P. Mythili, R.Gopalakrishnan
(6) 2010	Effect of cobalt and DL-malic acid on the growth rate, crystalline perfection, optical, ADP single crystals.	Physica B 405 (2010) 2401-06.	P. Rajesh, P. Ramasamy, G. Bhagavannarayana.

(5) 2009	Piezoelectric, dielectric, optical and electrical characterization of solution grown ZnO nano crystals.	Material Letters 63 1910-1913 (2009).	M.K. Gupta, N. Sinha, BK Singh, N. Singh, K.Kumar
(4) 2009	Flux growth and low temperature dielectric relaxation in piezoelectric $Pb[(Zn_{1/3}Nb_{2/3})_{0.91}Ti_{0.09}]O_3$ single crystals.	Cryst. Res. Technol 44 No.9 915-924 (2009).	B.K. Singh, K. Kumar, Nidhi Sinha
(3) 2009	Evidence of additional phase transitions at lower temperatures in the flux grown $Pb (Zn_{1/3} Nb_{2/3})_{0.91} Ti_{0.09} O_3$ single crystal.	Materials Letters 63, p.625–628 (2009).	B.K. Singh
(2) 2009	Solution Growth and Comparative Characterization of L-HFB Single Crystals.	Cryst. Res. Technol. 44, 167-172 (2009).	Nidhi Sinha, Sahas, B.K. Singh, N. Singh, K. Kumar, M.K. Gupta, G.C. Budakoti
(1) 2009	Ferroelectricity in glycine picrate: An astonishing observation in a centrosymmetric crystal”	Applied Physics Letters, 95, 252902:1-3, (2009).	M. Shakir, B. K. Singh, G. Bhagavannarayana.

Review Article

“Growth and Characterization of $Bi_2Sr_2CaCuO_{8+\delta}$ High Tc Superconducting Single Crystals”

Co authors: P. Kumar, I.K. Bdkin and G.C. Trigunayat. In: Superconductivity Research Horizons, Ed: E.H. Peterson, Nova Science Publisher, Inc, USA, p. 71-110 (2007).

Ph.D. Supervision: (2010-11 only): Ph. D. Degree awarded to:

- (a) Dr. B.K. Singh on “Structural, Piezoelectric, Dielectric, Optical and Electrical Characterization of Flux Grown $Pb[(Zn_{1/3}Nb_{2/3})_{0.91}Ti_{0.09}]O_3$ Single Crystal”
- (b) Dr. Krishan Kumar on: “Synthesis and characterization of pure and (Sb, Nb & Ta) doped lead free piezoelectric $Bi_{0.5}(Na_{0.5}K_{0.5})_{0.5}TiO_3$ Ceramics”

Conference Presentations (2009-11 Only)

Invited Talk and other presentations

- [1] Invited Talk on “Study of crystal growth and defect features by optical, scanning and tunneling microscope” in the XV National Seminar on Crystal Growth from 23-25, February 2011. Tirunelveli – TamilNadu
- [2] Invited Talk on “Growth and characterization of technologically important crystals” in UGC Sponsored Conference on “Recent Trends in Materials Research” during 29th - 30th January, 2011, Kalyan, Mumbai
- [3] “Quality control of technologically important crystals for various applications” Invited Talk in National Symposium “Synthesis, Characterization and Applications of Technologically Important Material” 5-6 Jan. 2010, BHU, Varanasi.
- [4] “Need of Technologically Important Crystals” Key Note address at UGC sponsored “National Conference on Recent Trends in Material Synthesis and Characterization”, at Nagpur, 4th - 5th December 2009.
- [5] Five papers are presented in “The 17th American Conference on Crystal Growth and Epitaxy (9-14 August, 2009) at Lake Geneva, Wisconsin, USA”.
- [6] “Pb-based and Pb-free piezoelectric systems for high performance applications” Invited Talk in International Conference on Electroceramics, Delhi 13-17 Dec. 2009.
- [7] “Development of high performance piezoelectric single crystals for applications” Invited Talk at Variable Energy Cyclotron Center, Kolkata, 18th June 09.
- [8] “High performance piezoelectric crystals: Growth, Characterization and Applications” Invited Talk in National Conference on Advanced Materials – Processing, Characterization and Applications. Tirunelveli, Tamilnadu, Aug. 09.
- [9] Five Invited Talks at Crystal Growth Center, Anna University as Senior Associate in UGC:CGC-AU Facility, March, 09. (a) Enhancement of crystalline and material properties of superconducting Bi-2212 and piezoelectric LiNbO₃ single crystals through post growth treatments (b) Piezoelectric, dielectric and structural characterization of flux grown PZNT single crystals (c) Morphology and growth features on variously grown crystals (d) Quality control of semiorganic NLO single crystals through optimization of pH-value (e) Need of Pb-free high performance piezoelectric system.
- [10] “Growth and characterization of Pb-based and Pb-free Piezoelectric crystals” Invited Talk by Binay Kumar. In: 13th National Seminar on Crystal Growth 27-29 Jan 2009 SSN College of Engineering, Tamil Nadu. Collected Abstract Page I-11.
- [11] “Crystals: Through the eyes of microscope” Invited Talk by Binay Kumar. In: National Conference on Microscopy and Allied Fields 17-20 Jan 2009, Jhansi, Collected Abstract p.37-38.
- [12] “High performance piezoelectric crystals: Growth, Characterization and Applications” Invited Talk by Binay Kumar National Conference on Advanced Materials – Processing, Characterization and Applications. Tirunelveli, Tamilnadu, Aug.09.
- [13] Four Papers in “The 13th National Seminar on Crystal Growth (27-29 January, 2009) SSN College, SSN Nagar, Chennai, Tamilnadu”.
- [14] Four papers in “The 38th National Seminar on Crystallography (11-13 February 2009), University of Mysore”

Total Publication Profile **optional**

<u>Books</u> : One.
<u>In Indexed/ Peer Reviewed Journals</u> : Fifty two
<u>Review Articles</u> : One
<u>Conference and other Presentations</u> : Over 25 in 2009-11
Public Service / University Service / Consulting Activity
Served as a member of various academic bodies like Faculty of Science, BRS, Dy Superintendent of Exams, etc. Examiner for more than five Ph.D. Thesis of other Universities during 2009-11.
Professional Societies Memberships
Indian Crystallographic Association Semiconductor Society of India Indian association of Physics Teachers Electron Microscopic Society of India
Projects (Major Grants / Collaborations)
<ol style="list-style-type: none"> 1. Principal Investigator, DST Project " Growth of Device Level Lead free Alkali-Based Piezoelectric Single Crystals" (2011-14) 2. Principal Investigator, DST Project "Synthesis of High Performance Piezoelectric Ceramic & Crystals for Device Fabrication" 2007-10 (46 Lac). 3. Principal Investigator "Growth of Device Level Non Linear Optical Organic/Semi- Organic Single Crystals By Various Methods" (2009-2012); PURSE Grant; 35 lacs. 4. Dy Coordinator, UGC Superconductivity R & D Programme during 2000-2004 (>17 Lac). 5. Received financial support (2.5 Lac) three times during 2009-2011 for research work from Delhi University.
Other Details

Organized a “National Conference on Advances in Technologically Important Crystals (NC-ATIC) during 12-14 October, 2006 in the Department of Physics & Astrophysics, University of Delhi, Delhi-110007