

## BIODATA

- **Name** : **Kasturi Lal Chopra**
- **Date & Place of Birth** : July 31, 1933; Chahal Kalan, W Panjab (now Pakistan)
- **Address (Res)** : M-70, Kirti Nagar, New Delhi - 110 015.  
Tel: +91 11 25154114  
E-mail: choprakl@yahoo.com
- **Education** : *B.Sc. (Hons)* (1952); *M.Sc.* (1954), Delhi University;  
*Ph.D.* (1957), Univ. of British Columbia  
(*under World University Fellowship*)
- **Positions Held** :
  1. Advisor, JUET, Guna, MP ; Chairman , HDF School of Management Bhubneshwar ; Chairman , BBIT, Kolkata; Distinguished University Chair Professor , BESU , Kolkata & Advisor , Thin Film Laboratory IIT-Delhi, & **President**, Society for Scientific Values(2002- )
  2. **IREDA** Chair Professor (Renewable Energy) - April, 1997-July 31, 2000.
  3. **Director**, Indian Institute of Technology, Kharagpur (1987-1997).
  4. **Senior Professor** of Physics and Head of the Thin Film Solid State Technology Laboratory , Indian Institute of Technology, New Delhi &
    - (a) **Dean** Industrial Research and Development (1985-87).
    - (b) **Head**, Centre for Energy Studies (1983-85).
    - (c) **Dean**, Post Graduate Studies and Research (1976-79).
    - (d) **Chairman/Dean** Industrial Research and Development (1975-76).
    - (e) **Dean**, Faculty of Science (1973-74).
    - (f) **Head**, Department of Physics (1970-73).
  5. **Visiting Professor**, Cornell University, U.S.A.; & **Consultant** to ARCO, Westinghouse and IBM Research Centres (1979-80).
  6. **Staff Scientist**, Ledgemont Lab., Kennecott Copper Corporation, USA and concurrently
  7. **Adjunct Professor**, North East Univ., Boston, MA, USA (1964-70).
  8. **Research Specialist** (Group Leader) at Philco-Ford Scientific Laboratory, Blue Bell, U.S.A. (1962-64).
  9. **Max-Planck Fellow**-Guest Scientist, Fritz-Haber Institute, Berlin, West Germany (1959-62).
  10. **Research Fellow**, Defence Research Board of Canada (1957-59).
- **Awards :**
  - ❖ D Sc (Honoris Causa) conferred by Indian Institute of Technology, Kharagpur(2010)
  - ❖ D S Kothari Memorial Oration Award, Defence Lab, Jodhpur (2009)
  - ❖ Padma Shri (National Honour for Science & Engineering Contributions), Government of India (2008)
  - ❖ Distinguished Engineering Educator Award, Indian Society of Mechanical Engineers (2008)
  - ❖ D Sc (Honoris Causa) conferred by UP Technical University (2006)
  - ❖ Aryabhata Gold Medal, Indian National Science Academy(INSA), 2004
  - ❖ ISI Citation Laureate Award, ISI, USA (2004)
  - ❖ Photovoltaic Life -time Achievement Award, Solar Energy Soc, India (2001)
  - ❖ Biren Roy Memorial Lecture Award (1997)
  - ❖ P.C. Mahalanobis Medal Award, INSA (1996)
  - ❖ Distinguished Material Scientist Award, MRSI (1994)
  - ❖ Distinguished Vacuum Scientist Award ,Indian Vacuum Society (1994)
  - ❖ K.S. Krishnan Memorial Lecture Award, INSA (1992)

- ❖ Bhasin Award (Science & Engineering), Bhasin Foundation (1989)
  - ❖ Bhabha Award (Applied Physics) UGC/Hari Om Trust (1989)
  - ❖ S.S. Bhatnagar Award (Solar Energy) Hari Om Trust (1985)
  - ❖ FICCI Science & Technology Award (1983)
  - ❖ S.S. Bhatnagar Prize (Physics) CSIR (1975)
  - ❖ Four Kennecott Copper Corporation Patent Awards (1966-70)
  - ❖ World University Fellowship (1954-57)
  - ❖ Max Planck Fellowship (1962-64)
- **Professional Society Fellowships :**
    - ❖ Fellow, Indian National Science Academy
    - ❖ Fellow, Indian Academy of Sciences
    - ❖ Fellow, National Academy of Sciences
    - ❖ Fellow, Indian Academy of Engineering
    - ❖ Fellow, Asia-Pacific Materials Research Society
    - ❖ Fellow, American Physical Society
- **Special Lectures :**
    - ❖ S S Rao Memorial Lecture, Rajdhani College, Delhi University, 2010
    - ❖ D S Kothari Memorial Oration, Defence Lab, Jodhpur, 2009
    - ❖ Vikram Sarabhai Memorial Lecture, IGCAR, 2009
    - ❖ Prof P N Dutta Memorial Lecture, ICAR, 2004
    - ❖ Triguna Sen Memorial Lecture, JU, 2003
    - ❖ Ramakrishna Memorial Lecture, 1998
    - ❖ A.S. Divatia Memorial Lecture, 1996
    - ❖ K.S. Krishnan Memorial Lecture, 1995
    - ❖ H.K. Sen Memorial Lecture, 1992
    - ❖ S.K. Mitra Memorial Lectures, 1989
    - ❖ Tantia (Bajaj Foundation) Memorial Lecture, 1988
    - ❖ Rippon Professorship Lectures, I.A.C.S., 1981
    - ❖ G.C. Jain Memorial Lecture, N.P.L., 1983
    - ❖ U.G.C. National Lecturer, 1982-83
    - ❖ Balkrishna Memorial Lecture, B.A.R.C., 1975
    - ❖ U.S.S.R. Academy of Science Lectures, 1970
- **Association with Professional Committees :**
    - ❖ Member, National Science Committee, UNESCO
    - ❖ Trustee, Welch Foundation Scholarship, USA
    - ❖ Chairman, Seventh International Conference on Thin Films, 1987
    - ❖ Member, IUPAP National Committee
    - ❖ Member, International Committee on Solid Films and Surfaces, 1974, 1983, 1989, 1997
    - ❖ Member/Chairman, UGC Reviewing Committee, 1975, 1983
    - ❖ Member, Executive Committee, National Physical Laboratory, 1973-76
    - ❖ Member, Advisory Committee, Centre for Advanced Studies in Physics, Delhi University
    - ❖ Member, Advisory Committee, Cement Research Institute of India, 1977-79
    - ❖ Vice President Electron Microscope Society of India, 1985
    - ❖ President, Indian Vacuum Society, 1978-80
    - ❖ Member, IUUVSTA, Thin Film Division, 1982-87
    - ❖ Chairman, Program Committee, Int Conf on Photovoltaics, 1995
    - ❖ Chairman, Physics Research Committee, C.S.I.R., 1983-89; 1998-2001
    - ❖ Member, Advisory Committees : UGC, DST, DOE, DNES & CART
    - ❖ Member, INSA Council
    - ❖ Member, Central Advisory Board on Education,
    - ❖ Chairman, Dalmia Research Centre 1995-1997

- ❖ Chairman, RIT Review Committee, 1988
  - ❖ Vice President, Materials Research Society of India
  - ❖ President, Society for Scientific Values, 2002-
  - ❖ Member, Editorial Board, Journals : IJP, IJPAP, BMS, TSF, NonCrystalline Solids, Prog in Photovoltaics, Appl Physics Communications
  - ❖ Associate Editor, J. Solar Energy Mat & Solar Cells( Elsevier)
- **Research Areas :** Solid State Physics and Technology of Thin Films & Nanomaterials; Surface Science & Technology; Vacuum Science & Technology, Thin Film Solar Cells; High Temperature Superconductors; Amorphous Materials;
- **Publications :**
- (a) **Books :**
1. *Thin Film Phenomena* by Chopra, McGraw Hill, USA, 1969  
(Translated into Russian by MIR Press)
  2. *Thin Film Solar Cells* by Chopra and Das, Plenum Press USA, 1983  
(Translated into Russian by MIR Press).
  3. *Thin Film Device Applications* by Chopra and Kaur, Plenum Press USA, 1983.
  4. *Optical Behaviour of Materials*, Ed. Chopra, Thomson Press India, 1972
  5. *Vacuum-Surfaces-Thin Films*, Eds. Chopra and Goel, Vanity Press India, 1981.
  6. *Thin Film Technology and Applications*, Eds. Chopra and Malhotra, Tata McGraw Hill, India, 1985.
  7. *Thin Films 7 - Proc ICTF-7*, Ed. Chopra, Elsevier, 1987.
  8. *Vacuum Science & Technology*, Rao, Ghosh and Chopra, Allied Publ, 1998.
  9. *Technical Education in Independent India*, Eds. : Gupta, Chopra and Suri, Published by AICTE, New Delhi ,2000.
  10. *Profile of Engineering Education in India: Status, Concerns and Recommendations* by Biswas, Chopra, Jha and Singh, INAE Pub, Narosa, 2009
- (b) **Research Papers** : About **430** in refereed journals:  
*One of the seven “Most Highly Cited Scientists of India” - as per Institute of Scientific Information, USA*
- **Supervision of Ph D Theses** : **60 Ph D & about 100 M Tech Theses**
  - **Patents :**
    1. Deposition of Ultrathin Non-Metal Films (US Patent 3,463 ,667).
    2. Deposition of Ultrathin Metal Films (US Patent, 463, 663).
    3. Duoplasmatron Ion-Beam Apparatus (US Patent 3, 408, 283)
    4. Vacuum Sputtering (US Patent 3,409,529).
    5. Current controlled Negative Resistance Devices (filed with Philco-Ford Scientific Laboratory).
    6. Synthesis of cubic boron nitride films using the activated dissociation reduction reaction process, (US Patent 4,714,625).
    7. Synthesis of Nano Sized Oxide Ceramic Powders (Patent filed in India).
  - **Know-how Transferred :**
    1. 6 kW Electron Gun to VICO, New Delhi
    2. TEM Grids to Montech Instruments, Chandigarh
    3. Ophthalmic Glass Coatings to Laxmi Opticians, New Delhi
    4. Thin Film CdS Photocells to Patel Enterprises, Bangalore
    5. R.F. Magnetron sputtering module to I.B.P., Mumbai
    6. ZnO Varistors to W.S. Insulators, Chennai
    7. Copper Black Selective Coatings to Jyoti Ltd, Baroda
    8. Synthesis of nano- sized magnesium aluminate hydrate to A.C.C., Mumbai
  - **Consultant to :** IBM, Westinghouse R&D , ARCO, VICO, Jyoti Ltd, HMT, HHV

## **Summary of Significant Contributions of Prof K L Chopra**

- **SCIENTIFIC :**
  - ❖ Discovered field induced nucleation and growth of thin –films
  - ❖ Discovered giant photo-contraction effect in amorphous chalcogenide films
  - ❖ Established specular scattering of conduction electrons in thin epitaxial metal films
  - ❖ Established size effects in electron transport processes in metal films
  - ❖ First to use concept of superlattices for graded optical constant films
  - ❖ First to develop ion-beam sputter –deposition process
  - ❖ Established empirical rules for occurrence of metastable and polymorphic structures in thin films
  - ❖ Developed physics of transparent oxide conductors, particularly zinc oxide which is now used commercially by numerous solar cell industries
  - ❖ Developed a chemical solution growth technique for chalcogenide films which are now used by all thin-film solar cell manufacturers
  - ❖ Developed semiconducting polymers for applications
  - ❖ Developed several chemical processes, including a Pyrophoric Process, for producing nano-composite powders of multiple component oxides
  - ❖ Developed techniques for surface engineering for tribological and for solar energy conversion applications
  - ❖ Developed and studied a-Si , Cu-In-S , and Cu<sub>2</sub>S thin-film solar cells as pioneering work in the field
  
- **PUBLICATIONS**
  - ❖ 450 Scientific publications in international journals
  - ❖ As per Citation Index , one of the seven most cited Indian scientist
  - ❖ Some 20 Classic papers as defined by the Citation Index
  - ❖ Authored Five Books (two translated in Russian and Japanese)
  - ❖ The first book “Thin Film Phenomena”, published in 1969 continues to be considered the Bible of the field of thin films and nanomaterials
  
- **PhD Theses Supervised**

Supervised 60 theses. All students are doing very well. Fifteen Ph D students are CEOs of their own companies in USA and in India
  
- **PATENTS**
  - Six US and one Indian. Three patents have been utilised by the industry
  
- **TECHNOLOGY TRANSFER & CONSULTANCY**
  - Eight Know-hows have been transferred. Some products are still in production
  - Consultancy to a large no of US and Indian companies, including IBM , Westinghouse, ARCO, VICO, Jyoti , HMT, ACC, etc.
  - Advisor/ Member, Governing Board of several institutions & companies (e.g., IISW & BM, IEM, KIT, IACS, VICO, BigLeap, E- Macmillan
  - Member, Editorial Board of several national and international journals. Presently, also Editor, Solar Energy materials & Solar Cells
  
- **INSTITUTION BUILDING**
  - ❖ Established a unique Thin Film Laboratory , first of its kind and recognised for its excellence internationally, at IIT Delhi

- ❖ Established a Micro & Nano Science Laboratory at IIT , Kharagpur
- ❖ At the request of MHRD, spent two terms ( 10 years) at IIT Kharagpur and turned the IIT around from the verge of being closed due to prevailing chaos. IIT Kharagpur has now been rated by India Today as no ONE technical institution in the country.
- ❖ Established , among IITs being the first one , DST and State Govt. sponsored 100 acre STEP which is now cited as a model of entrepreneurship spirit
- ❖ Established several successful entrepreneurial companies involving faculty and alumni as entrepreneurs ,and some as joint ventures of IIT with outside companies
- ❖ Established for the first time in India a Technology Foundation with our Alumni and collected a Corpus Fund of about Rs 50 Crores for development of the Institute, partly with our 50:50 matching grant formula with MHRD
- ❖ Established ,for the first time in India, an alumnus sponsored School of Management, named after the donor, Vinod Gupta.
- ❖ Established a full fledged Bio-Engineering and Technology Department
- ❖ Established an E-Library, the first of its kind in India
- ❖ Established, for the first time, two Virtual IIT-KGP Campuses at Kolkata and Bhubeneshwar for PG programmes
- ❖ Established a sponsored School of Telecommunication named after my predecessor, G S Sanyal
- ❖ Helped extensively WB state Govt to establish IIIT, Kolkata in collaboration with industry
- ❖ Converted a split IIT-KGP campus to an integrated , isolated and self-contained one unit town with a boundary wall , a run-way for small planes, housing for all associated with IIT, and excellent public and private schools.