

My Ultimate Reflections

N.M. Ravindra (Ravi)

Challenge

- My Last Lecture.....
- Format Free....
- What do I do tomorrow?
- Where Do I Begin Today?
- Here is my Untold Story.....
- My Own Evolution.....
- My Cultural, Spatial and Temporal Displacements.....

Outline

- Beginnings
- Philosophy
- Journey
- Homecoming
- NJIT & The Nobel Prize
- Walter Kosonocky – Collaborations
- Present Work
- Tomorrow ?

My Journeys in India



India



National Emblem

Motto: *"Satyameva Jayate"*
(Sanskrit)

"Truth Alone Triumphs"



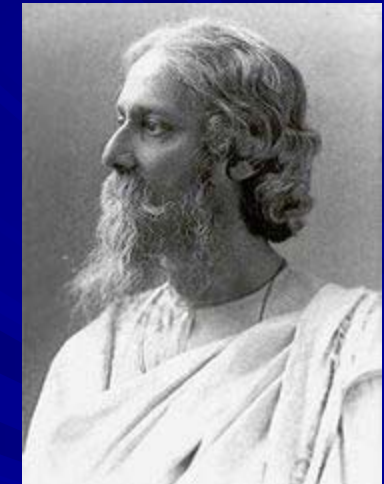
Population 2009 estimate 1,198,003,000

Anthem: *Jana Gana Mana*
Thou art the ruler of the minds of all people.

National Song *Vande Mataram*
I bow to thee, Mother

Official languages Hindi, English

29 individual languages



Rabindranath Tagore
Asia's first Nobel laureate and composer of India's national anthem.

My Beginnings (B)

Hyderabad

Language(s) Urdu, Telugu, Hindi, English

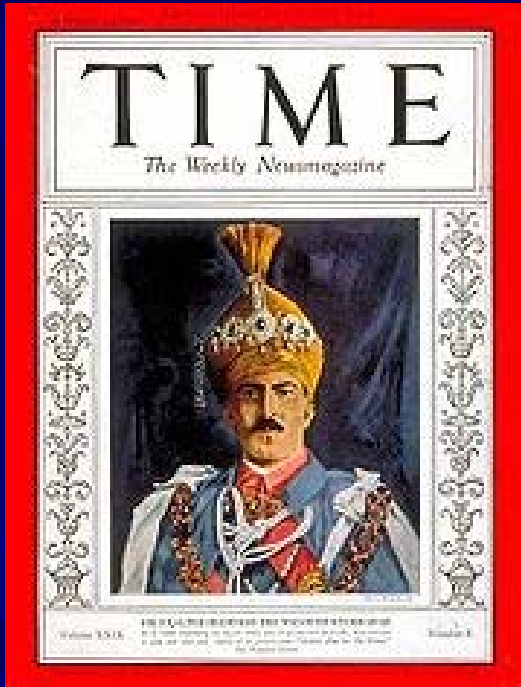


Charminar

Nizam

Nizam-ul-Mulk meaning *Administrator of the Realm*

Mulki



A cover story by TIME in February 22, 1937 called the last Nizam as the *wealthiest man in the world*.

Beginning Years

- Education over material wealth
- Self Confidence
- Self Discipline
- Being Stereotyped - Long hair story
- Scooter story
- Beliefs, philosophy and lessons from life.
- National Service Scheme
- Student Union Member

My College Years (-1977) Bangalore



← Bangalore Palace, built in 1887,
was home to the rulers of
Mysore

Indian Institute of Science - the premier
institute of science in India (1976-77). →



My Upbringing

India is a mysterious country.

Teacher - The Guru

The syllable *gu* means shadows

The syllable *ru*, he who disperses them,

Because of the power to disperse darkness
the guru is thus named.

– Advayataraka Upanishad 14-18, verse 5

Guru and God both appear before me. To whom should I
prostrate?

I bow before Guru who introduced God to me.



Contd.

Guru Kula

Guru Brahma, Guru Vishnu, Guru Devo Maheshwara.
Guru Sakshath Parambrahma, Tasmai Shri Gurave Namaha.

(tr: Guru is the creator Brahma, Guru is the preserver Vishnu, Guru is the destroyer Siva. Guru is directly the supreme spirit - I offer my salutations to this Guru.)

The guru-shishya tradition is the transmission of teachings from a guru to a 'śiṣya'.

To me personally, Hinduism is a way of life; it is not a religion.

My Role Models

Mother Teresa

Born 26 August 1910
Üsküb , Ottoman Empire

Died 5 September 1997
Calcutta, India

Ethnicity Albanian

Citizenship India (1948 - 1997)

Occupation Roman Catholic nun



Nobel Peace Prize in 1979.



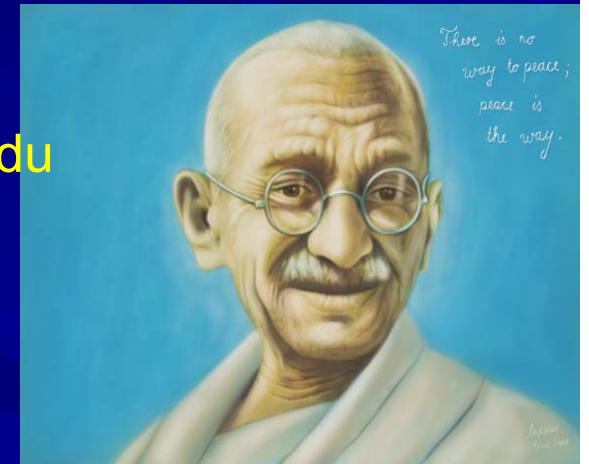
Bharat Ratna, in 1980 for her humanitarian work.

Contd.

Mohandas Karamchand Gandhi

Born 2 October 1869
Porbandar, Kathiawar Agency, British India

Died 30 January 1948
New Delhi, Union of India
Cause of death Assassination by a Hindu



Prominent Figure of Indian Independence Movement.

By Propounding the philosophy of Non-Violence

Politics and me



Rashtriya Swayamsevak Sangh
(National Volunteers Organization)

Akhil Bharatiya Vidyarthi Parishad
(ABVP, 'All-India Students' Council')

Ph.D. (1977-1981)

Roorkee

Campus ~ 360 acres
~ 4200 students
~ 375 faculty

The Institute has Academic
Collaboration with the following
universities:

University of Texas at Dallas

National University of Singapore

University of Waterloo

Royal Institute of
Technology(KTH),Stockholm



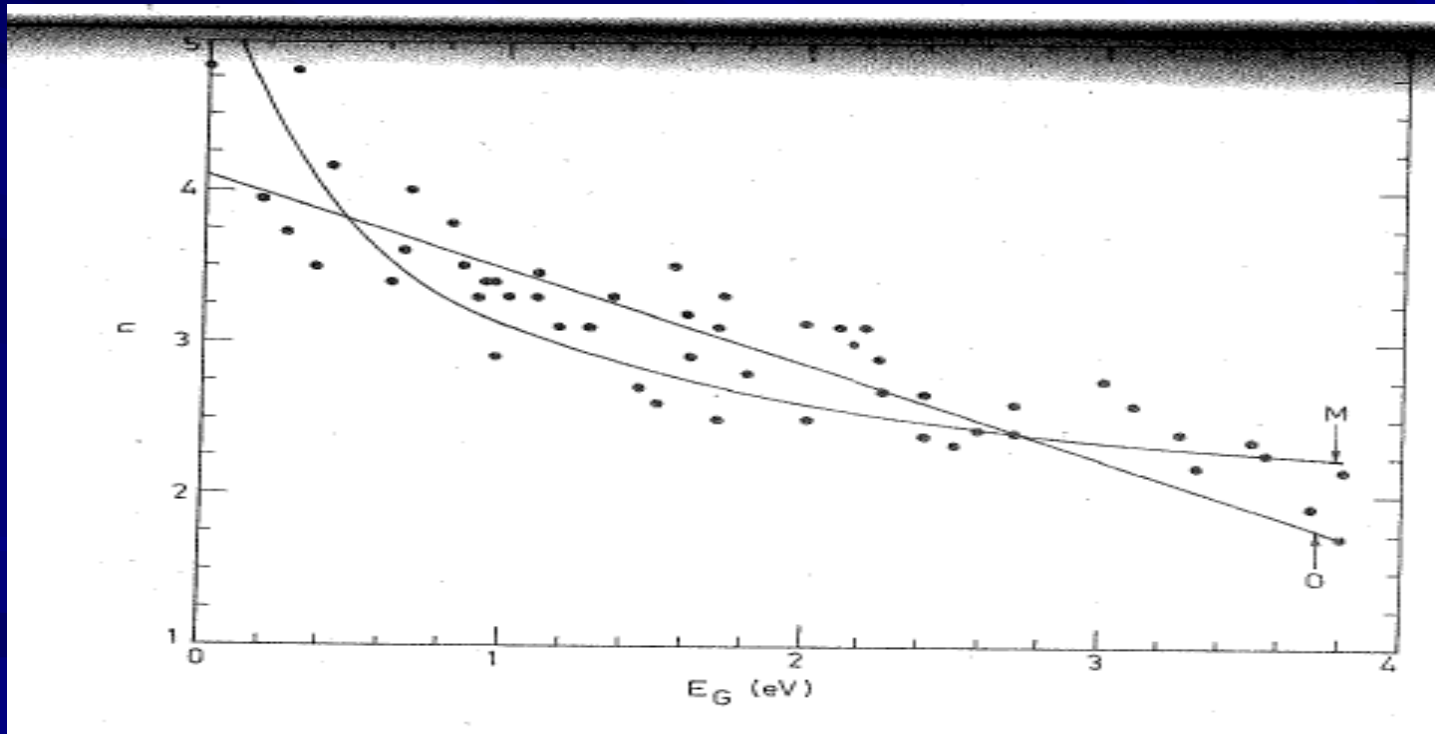
IIT Roorkee Main Administrative Building

Ravindra relation¹

Approximation of the Penn model²

$$n = 4.084 - 0.62 E_G$$

where n is the refractive index & E_G is energy gap,



¹N.M. Ravindra, Sushil Auluck and V.K. Srivastava, *Phys. Stat. Sol. (B)* **93** (1979), p. K155

²D. Penn, *Phys. Rev.* **128** (1962), p. 2093.

- Kumar, A., Ravindra, N.M. , *Effective charges and ionicity in alkali halides: An analysis* *Physical Review B* 25 (4), 1982, pp. 2889-2892.
- Gupta, V.P., Ravindra, N.M. COMMENTS ON THE MOSS FORMULA, *Physica Status Solidi (B) Basic Research* 100 (2), 1980 pp. 715-719.
- Kumar, A. , Ravindra, N.M. , Rath, R. Optoelectronic properties of alkali halides, *Journal of Physics and Chemistry of Solids*, 1979 40 (12), pp. 1141-1142.

Knowledge is a vast Ocean and it knows no Limits

**STUDIES OF SOME APPLIED ASPECTS OF
SEMICONDUCTORS INCLUDING THOSE
RELEVANT TO SOLAR CELLS AND
INFRA - RED DETECTORS**

A THESIS
submitted for the award of the degree
of
DOCTOR OF PHILOSOPHY
in
PHYSICS

by
N. M. RAVINDRA



DEPARTMENT OF PHYSICS
UNIVERSITY OF ROORKEE
ROORKEE-247672 (INDIA)

July, 1981

My First Job in India – Choices.....

Kanpur, IITK (1981-1982)

Campus 1,055 acres
 ~4,000 students



(c) 2006 Matt Welsh <http://www.eecs.harvard.edu/~mdw>

Had jobs at IIT Delhi and IIT Roorkee all at the same time.



France



Politecnico di Torino University of Paris



ICTP Main Building



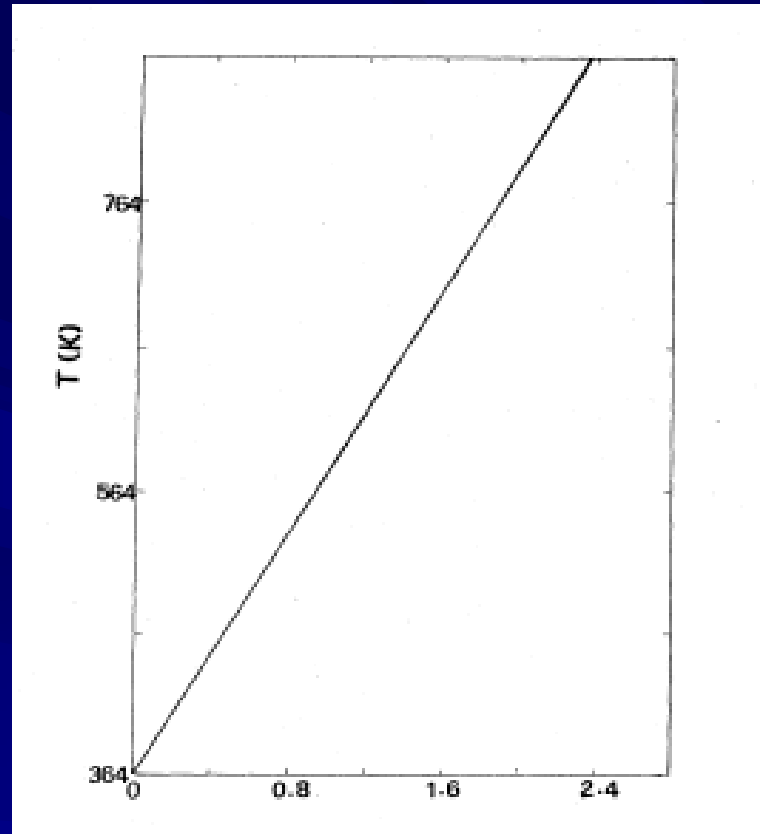
University of Montpellier



Italy

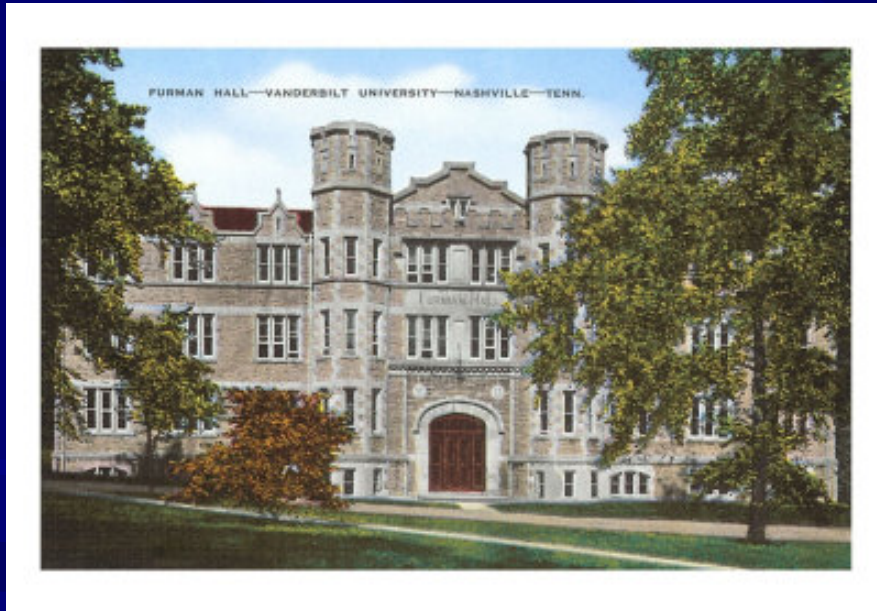
1982 - 1985

Examples of research of hydrogenated amorphous silicon



Cody disorder: Absorption-edge relationships in hydrogenated amorphous silicon
Phys. Rev. B 32, 6591 - 6595 (1985).

Influence of electrical and optical losses on fundamental solar-cell parameters,
***Il Nuovo Cimento D* 6 (3), 1985, pp. 251-260**



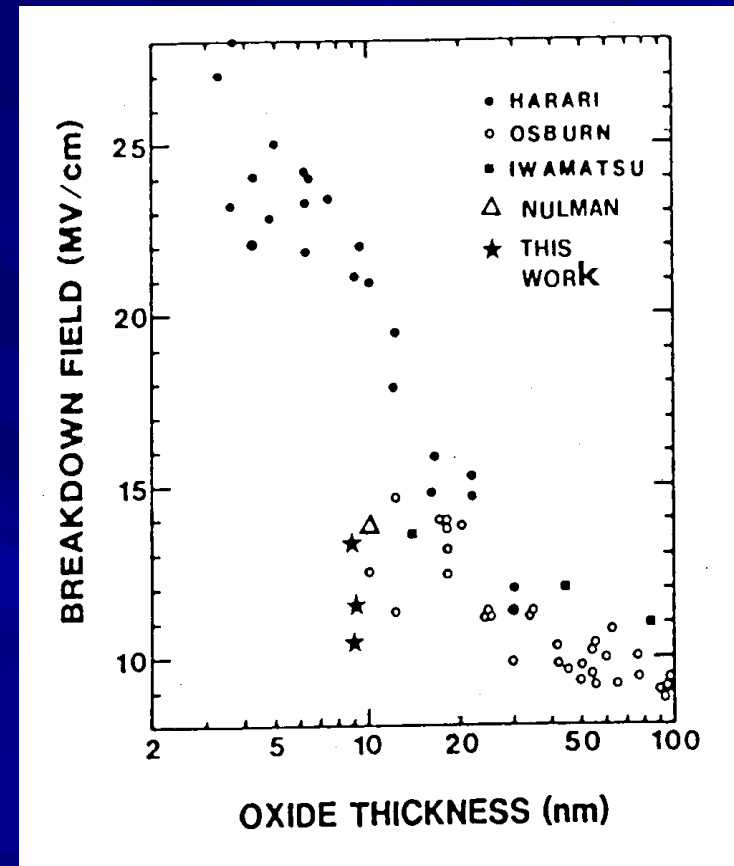
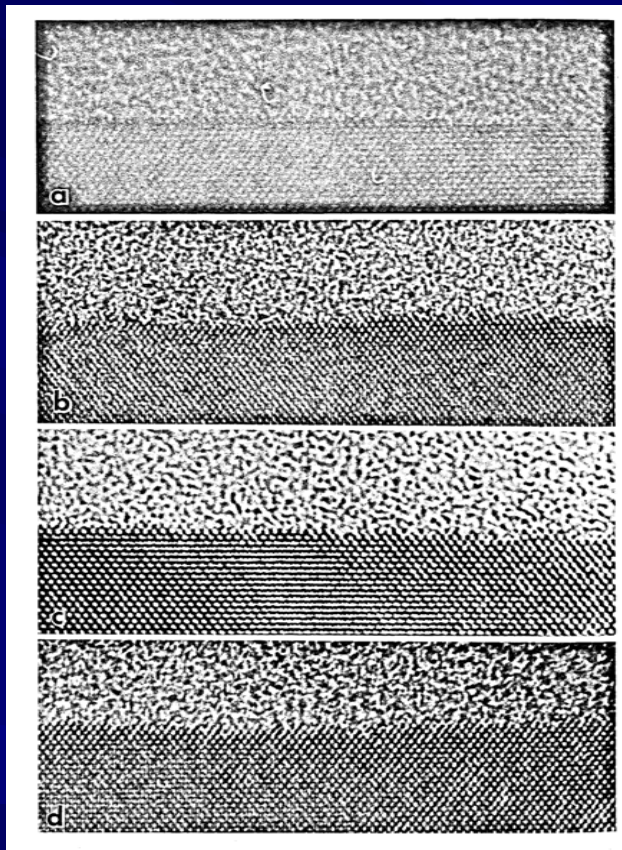
Vanderbilt University



Oak Ridge National Laboratory

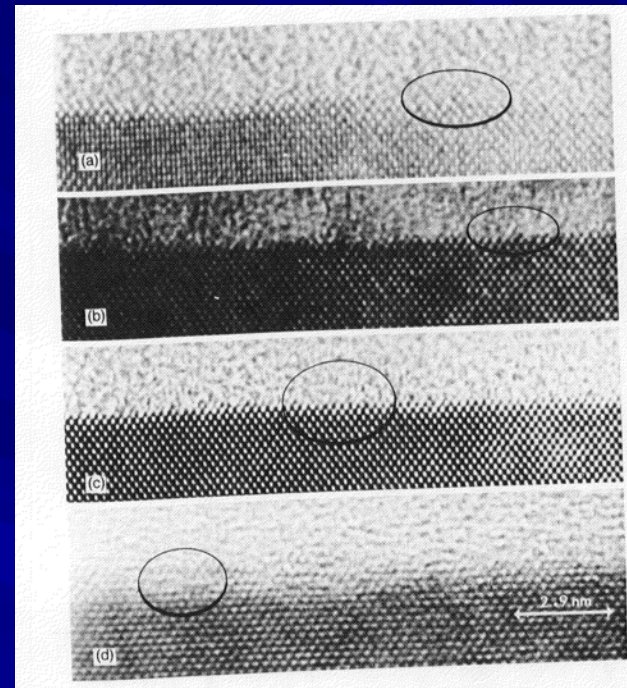
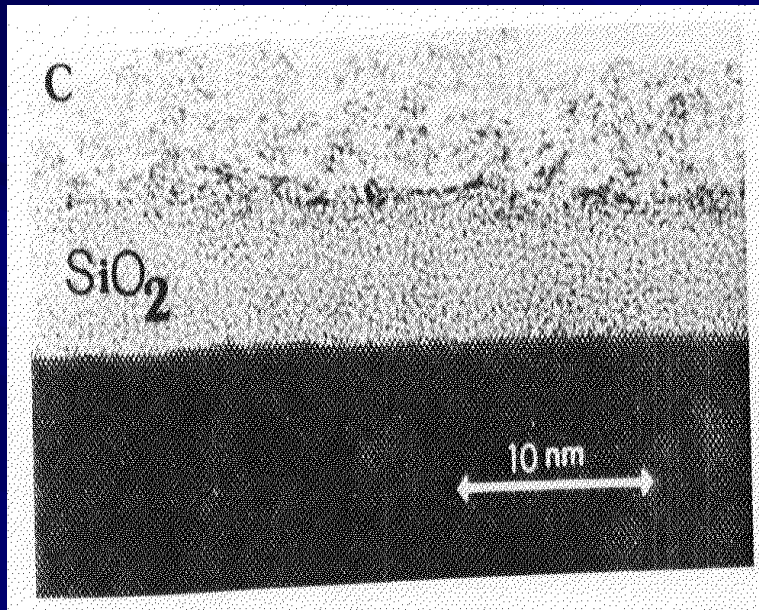
1985 - 1987

Examples of Nanotechnology



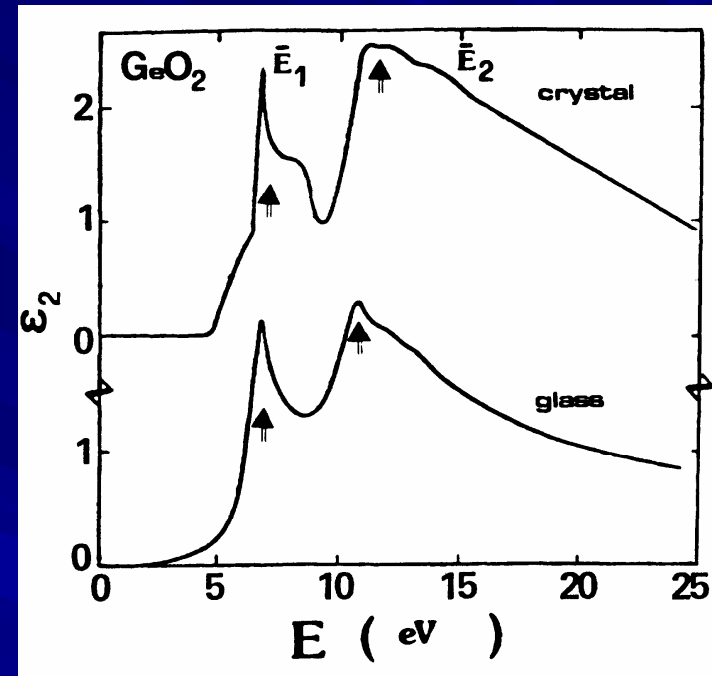
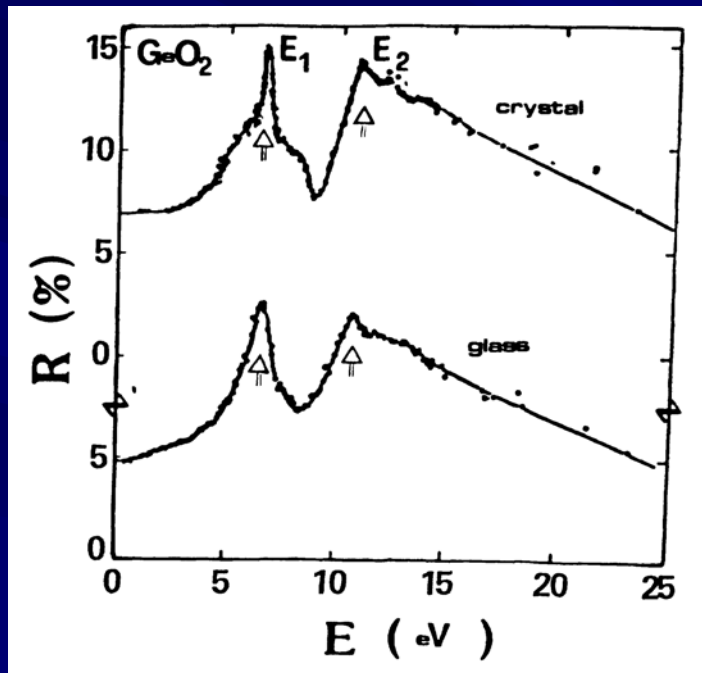
Two Step Oxidation, N.M. Ravindra et.al. Mat. Lett., Vol.4, pp.336-342 (

Examples of Nanotechnology



HRTEM Micrographs of Si – SiO₂ Interface, N.M. Ravindra et.al.,
J. Mater. Res., Vol.2, No.2, pp. 216 – 221 (1987).

Optical Properties of GeO_2



N.M. Ravindra et. al., Phys. Rev. B, Vol.36, pp.6132-6134 (1987)

My Mentors

S.K.Joshi (India)

Director General, CSIR



Abdus Salam

Director ICTP

Nobel Prize in Physics (1979)



Minko Balkanski

*Laboratoire de Physique de l'Ecole Normale
Supérieure, Paris, France*



J. Narayan

John Fan Family Distinguished Chair Professor
North Carolina State University,
Former Director, DMR (NSF)



NJIT Campus



1987 - Today



NJIT & Nobel Prize in Physics

Events that changed my life: W F K



- Research and Development of CCD's
- Author or co-author of 77 papers and was issued 47 U.S. patents
- Walter was "working" at a fundraiser for NJIT while dancing at a party on November 2, 1996 when he collapsed on the dance floor and passed away
- I had set up a meeting with John Poate and Anthony Fiory at Murray Hill, on 11.4.96 to resolve problems with Princeton University over distribution of research funds etc.

The Nobel Prize in Physics 2009

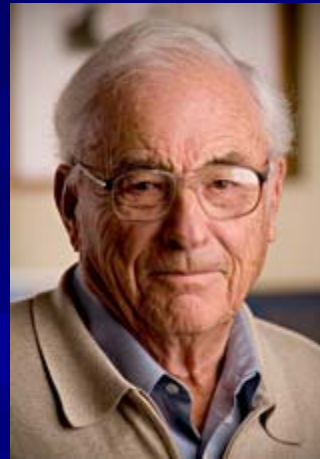
"for groundbreaking achievements concerning the transmission of light in fibers for optical communication"

"for the invention of an imaging semiconductor circuit – the CCD sensor"



Charles K. Kao
1/2 of the prize

Standard Telecomm. Laboratories
Harlow, UK;
Chinese Univ. of Hong Kong, China



Willard S. Boyle
1/4 of the prize

Bell Laboratories
Murray Hill, NJ, USA



George E. Smith
1/4 of the prize

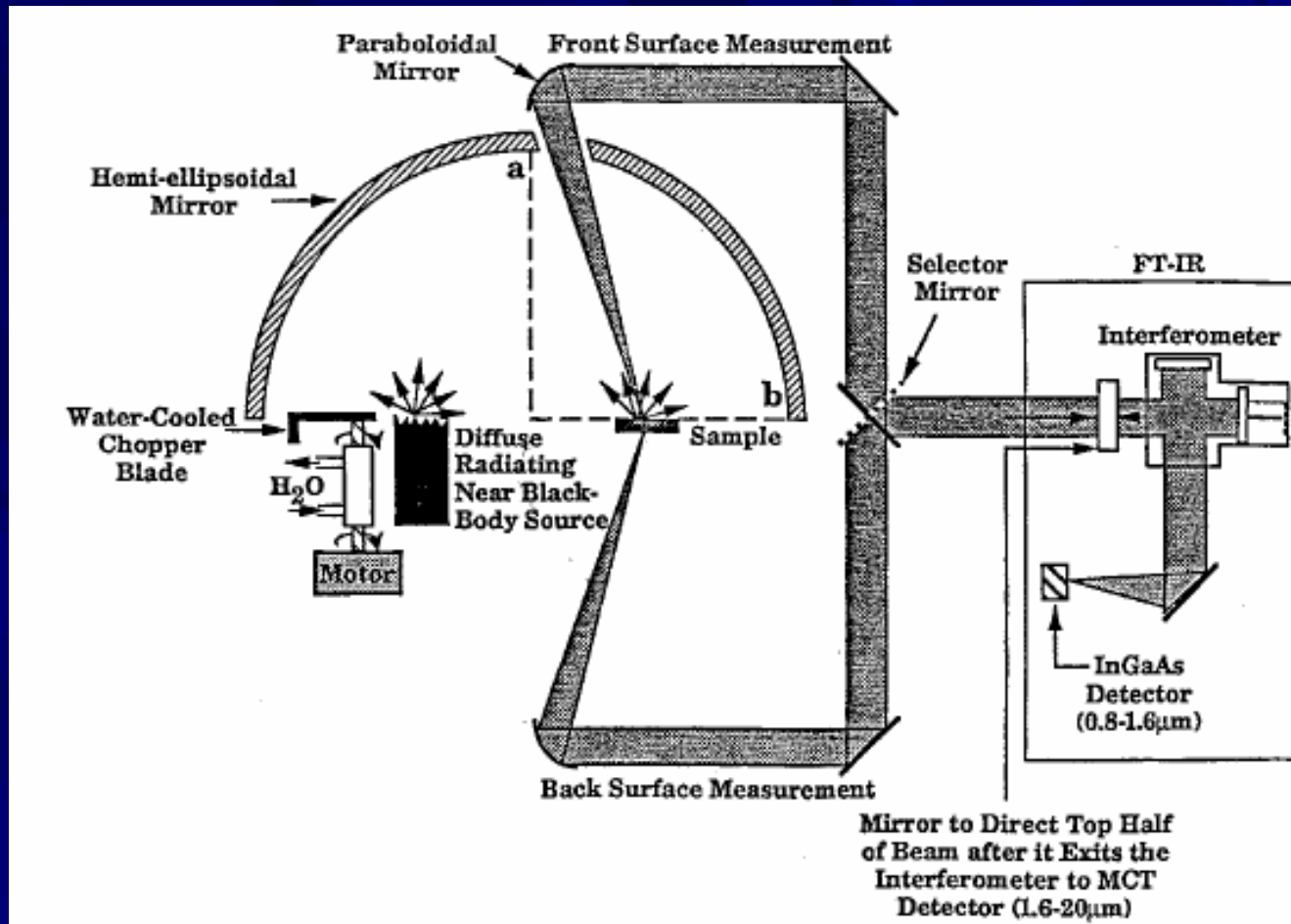
Bell Laboratories
Murray Hill, NJ, USA

Transient thermal processing techniques in electronic materials

proceedings of a symposium sponsored by the *Thin Films & Interfaces Committee of the Electronic, Magnetic, and Photonic Materials Division (EMPMD)* of TMS held during the 1996 TMS Annual Meeting in Anaheim, California, February 4-8, 1996

Published in 1996, Minerals, Metals and Materials Society
(Warrendale, Pa)

edited by N.M. Ravindra, R.K. Singh.

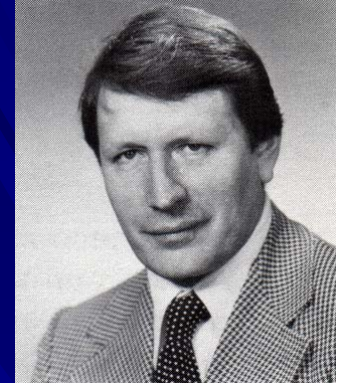


Schematic of Benchtop emissometer showing components and optical paths for radiance, reflectance, and transmittance measurements.

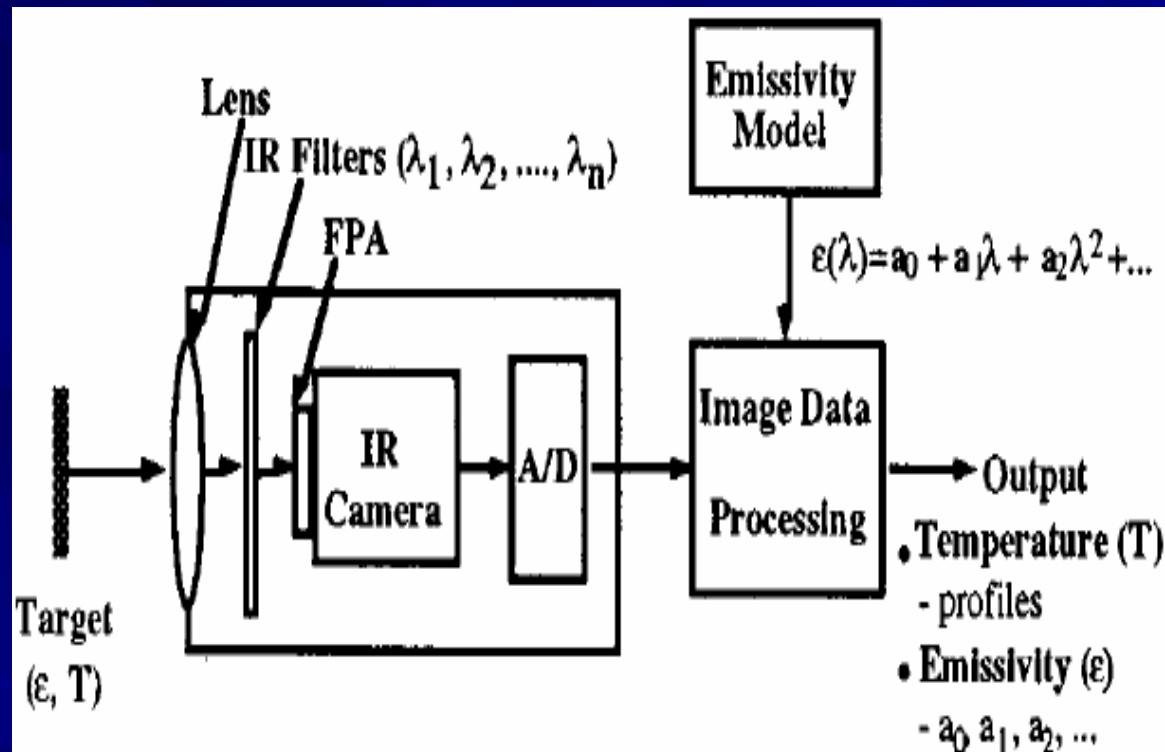
Ravindra, N.M., Abedrabbo, S., Chen, W., Tong, F.M., Nanda, A.K., Speranza, A.C. IEEE Transactions on Semiconductor Manufacturing 11 (1), 1998.



Collaborations with W. Kosonocky

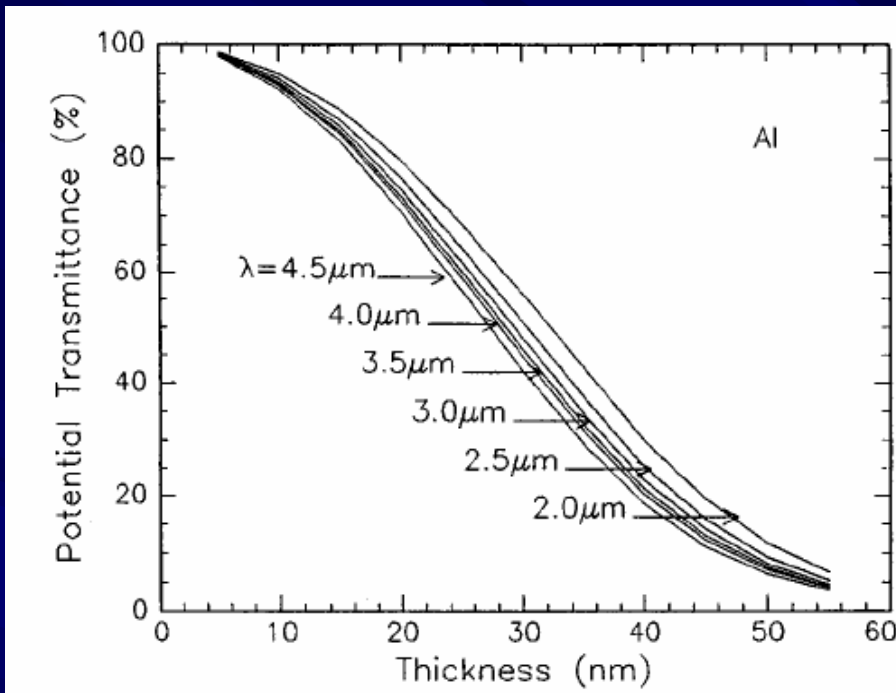


CCD Comb Filter Integrated Circuit
Electrical Engineering Department, NJIT

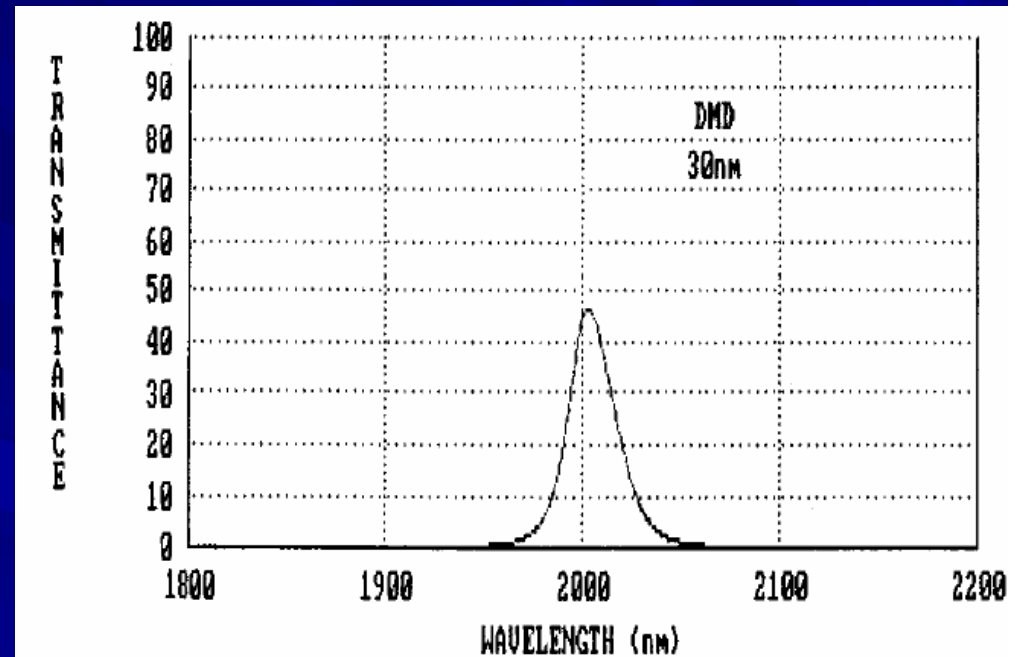


Multiwavelength imaging pyrometer (MWIP).

Recent advances in the development of a multiwavelength imaging pyrometer ,
Optical Engineering 36 (11), 1997, pp. 3176-3187.



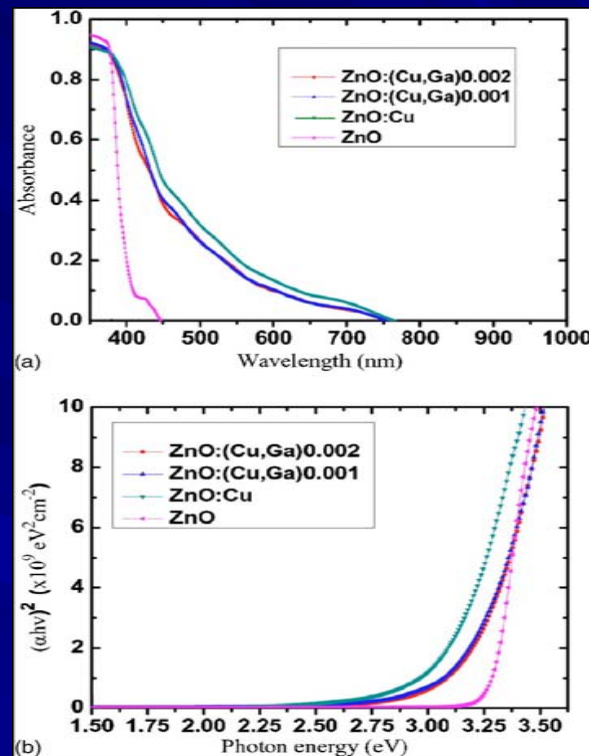
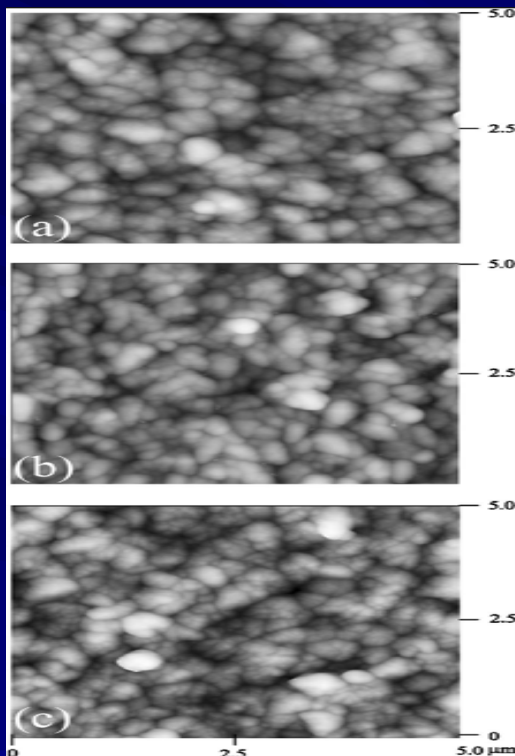
Potential transmittance of metal Al.



Calculated performance of the design with a peak wavelength of 2000 nm

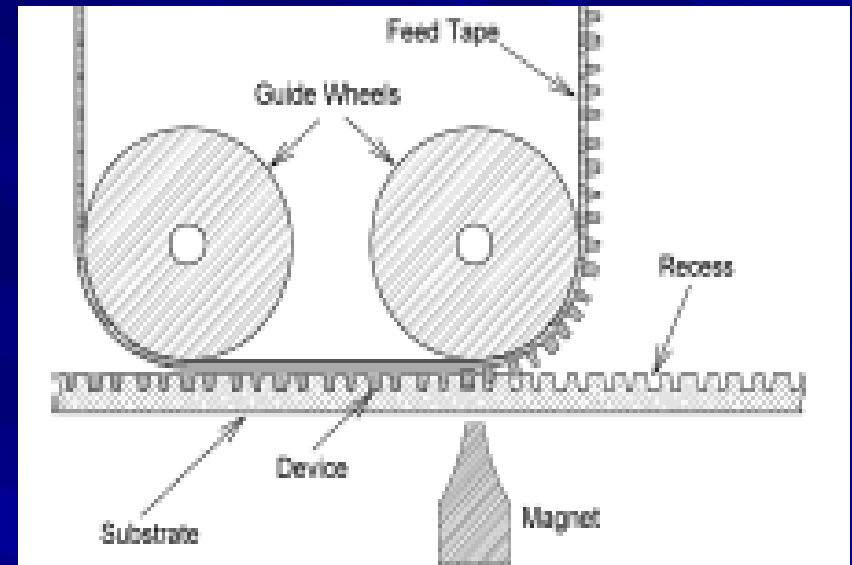
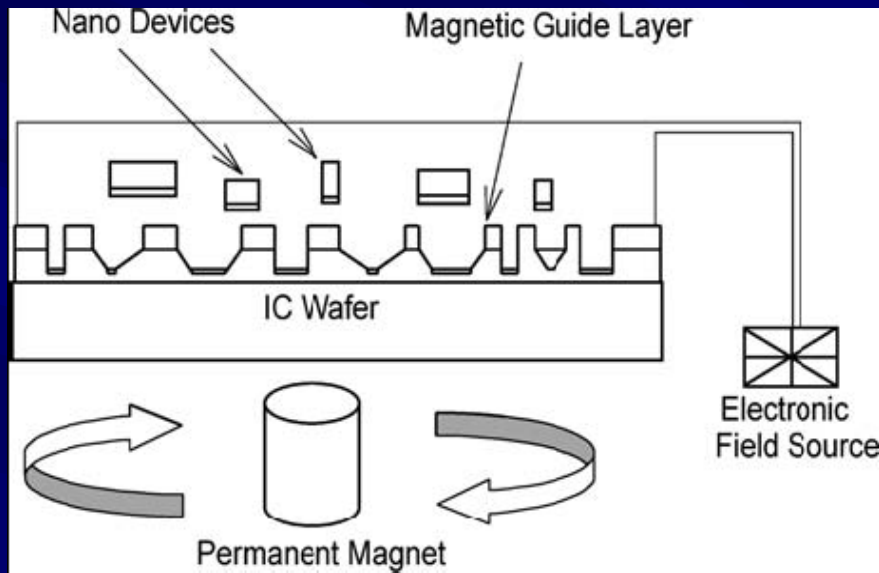
Tong, F.M., Ravindra, N.M., Kosonocky, W.F., Design and simulation of permissible tolerance during fabrication of infrared-induced transmission filters, *Optical Engineering* 36 (2), 1997, pp. 549-557.

Examples of Graduate Student Research – S. Shet



(Left) AFM images taken from a ZnO:Cu, b ZnO:Cu,Ga0.001, and c ZnO:Cu,Ga0.002 samples. (Right) Color online a Optical absorption curves and b absorption coefficients of ZnO, ZnO:Cu, ZnO:Cu,Ga0.001, and ZnO:Cu,Ga0.002 samples., S. Shet et. al., J. Appl. Phys., 103, 073504 (2008).

Inventions – Magnetic Field Assisted Assembly



(L) A schematic of the magnetic-field-assisted assembly method of integrating microcomponents and integrated circuits. (R). A schematic of the magnetic-field-assisted assembly process using feed tape (not to scale), Rene Rivero et. al., J. Elec. Mat., Vol. 37, pp. 374 – 378 (2008). [US Patent # 7217592].

PROJECT BASEBALL

<http://www.youtube.com/watch?v=2g7aZQWF9Io>

Aluminum versus wood Baseball Bats

<http://www.youtube.com/watch?v=jFgq6gyxpuw>

Gratification - Examples

Dear Dr. Ravindra,

Thank you very much!

We appreciated your positive feedback, prompt response, and cordial "open door" policy. The NJIT community is indeed lucky to have you on board.

We certainly enjoyed meeting you!

Best regards,

Light in the Abyss

He shines like a light through the darkness,
A seeming illusion in the desert,
It seems as though it is too good to be true,
But really, he is just my father.

He is an intelligent person,
Very skilled at teaching,
But he also will help me before himself,
Yes, he indeed is my father.

He is my beacon on an island,
Helping escape the clutches of danger,
He can help regardless of the problem,
Because he is my father.

He has the ability to help my life,
To assist in almost anything,
He will even help my friends before himself
And he is still my father.

I wish there was something,
I could give to you,
Good enough for you,
But all I can do is say thanks,
Thank you, Father.

Jayant G. Ravindra

My Personal Philosophy

- **Life is an opportunity to:**
 - **be useful**
 - **be a better person**
 - **to do good to society**
 - **to be a better teacher**
 - **to do good and useful science**

Tomorrow ?

Thank you