



Samtel Centre for Display Technologies

Indian Institute of Technology Kanpur



Satyendra Kumar
Coordinator, SCDT

Samtel Centre for Display Technologies

*A new 'inter'-disciplinary
Initiative on
DISPLAY TECHNOLOGY
was born with the signing
of MOU between
Samtel Industries & IIT
Kanpur on 5 March 2000*



Feb 24, 2001

New Building: July 2003

Clean Room (PDU Inauguration) : June 2006

ASID'06 – October 2006

Full Color OLED Display - 2007

Samtel Centre for Display Technologies

Objectives of the Centre

- **To conduct basic research in science and technology relevant to the field of electronic displays.**
- **To establish a tripartite relationship between industry, academia and various governmental agencies to nurture and support the growth of science and technology in the field of electronic displays with the aim of making India a global leader in Display Technology.**
- **To undertake Human Resource Development in display technology,**
- **To organize continuing education programmes in areas related to display technology,**
- **To organize other professional activities such as Conferences, Workshops, and Short Courses in display technology,**

Samtel Centre for Display Technologies Governance

National Advisory Committee

Prof. S.G.Dhande (Chair)
Director, IIT Kanpur

Shri Satish K. Kaura (Co-chair)
CMD, Samtel Group of Industries

Dr. V.Rao Aiyagiri
Head SERC & Advisor, DST, New Delhi

Dr. Dipankar Banerjee
Chief Controller (R&D), DRDO

Dr. Harinarayana Kota
Raja Ramanna Fellow, NAL, Bangalore

Prof. K. Muralidhar
Dean R &D, IIT Kanpur

Prof. K.R.Sarma
Adviser Technology, Samtel Group of Industries

Dr. M.J.Zarabi
Former CMD, SCL, Chandigarh

Shri Rajesh Kakkar
Vice president (Strategy) Samtel Group of Industries

Prof. Satyendra Kumar
Coordinator, SCDT, IIT Kanpur

Centre Consultative Committee

Prof. S.G.Dhande (Chair)
Director, IIT Kanpur

Prof. K. Muralidhar
Dean R &D, IIT Kanpur

Prof. K.R.Sarma
Adviser Technology,
Samtel Group of Industries

Prof P.K. Kalra
Head, Electrical Engineering

Prof Rajiv Shekhar
Head, Materials & Metallurgical Engineering

Y.N. Mohapatra
Deepak Gupta
Monica Katiyar
S.S.K. Iyer
S Panda
A. Garg

Satyendra Kumar
Coordinator, SCDT, IIT Kanpur

**Samtel Centre for Display Technology
Personnel**

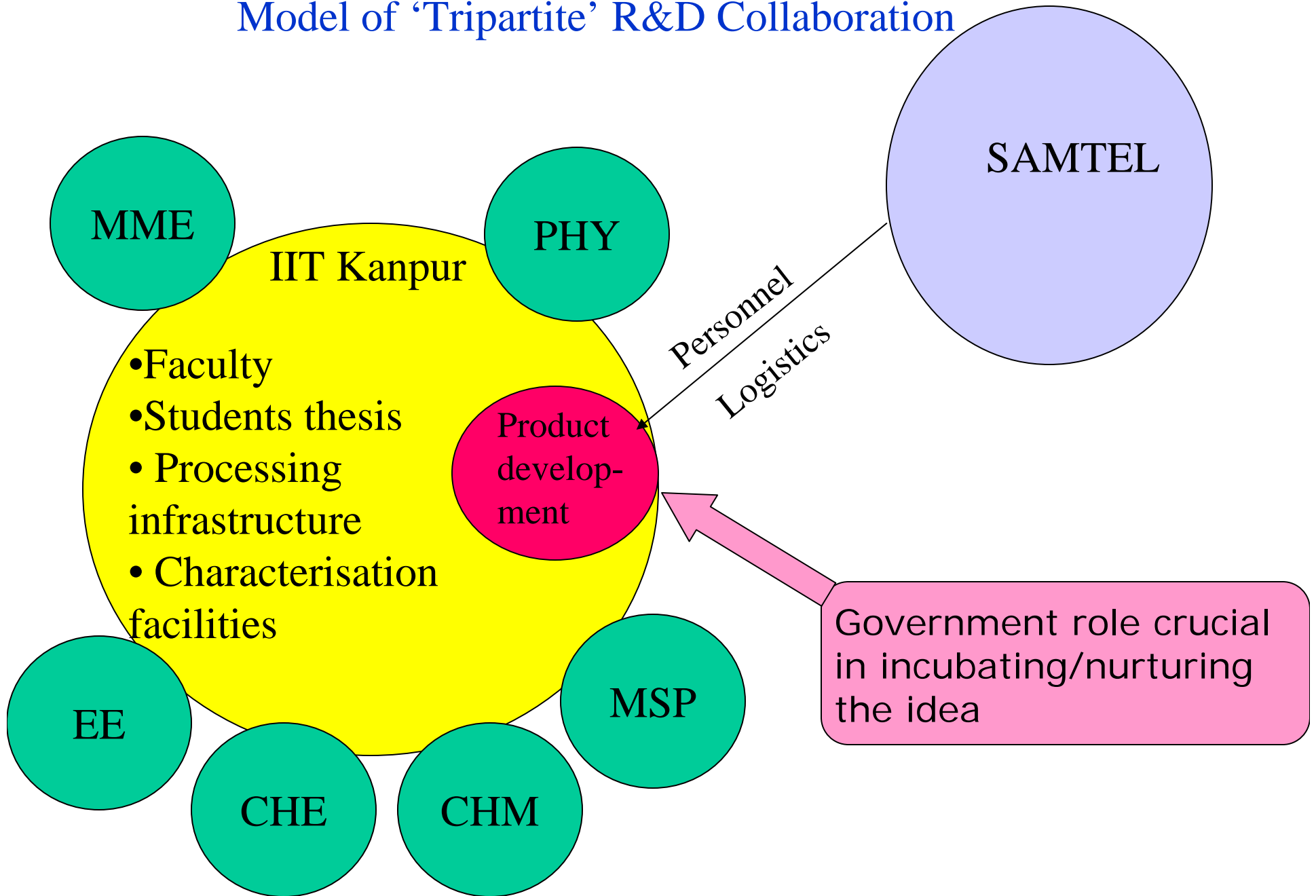
Core Faculty (Tuesday seminars, Thursday CGM, First Saturday of the month cleaning, everyday maintenance)

SI No	Name	Department
1	Dr. Satyendra Kumar	Physics
2	Dr. Y. N. Mohapatra	Physics
3	Dr. Baquer Mazhari	EE
4	Dr. Deepak Gupta	M.M.E
5	Dr. Monica Katiyar	M.M.E
6	Dr. S.S.K.Iyer	EE
7	Dr. Sidhartha Panda	ChE
8	Dr. Ashish Garg	MME
9	Dr. J. Narain	EE
10.	Dr. V. Tripathi	EE

Associated Faculty

SI No	Name	Department
1	Dr. R. Sharan (Founder Coordinator)	EE
2	Dr. R.S. Anand	EE
3	Dr. S. Manoharan	CHM
4	Dr. Gurunath	CHM
5	Dr. S. Sangal	M.M.E
6	Dr. B.K. Mishra	MME
7	Dr. S.G. Dhande	ME
8	Dr. N.V. Reddy	ME
9	Dr. PM Dixit	ME

Model of 'Tripartite' R&D Collaboration



Our Strength: Interdisciplinary Group

MME

OLED / TFT / Sensors

Glass Manufacturing,
PDP Simulator

Electrical Engg.

PDP Driver Electronics
High Voltage
OLED / TFT / Solar Cells

Mech. Engg.

Manufacturing ,
FEA: Funnel & Panel



Physics

Thin Films: MgO
OLED / TFT / Solar Cells
Phosphors

Chemical Engg.

Processing; Sensors

Chemistry

New Phosphors
Solar Cells , White Light

Members of SCDT, IIT Kanpur

Faculty

- Dr. Ashish Garg
- Dr. B. Mazhari
- Dr. Deepak Gupta
- Dr. J.Narain
- Dr. Monica Katiyar
- Dr. Satyendra Kumar
- Dr. S.S.K.Iyer
- Dr. Sidhartha Panda
- Dr. Vibha Tripathi
- Dr. Y.N.Mohapatra



Scientists/ Research Engineers

- Dr. Asha Awasthi
- Dr. Ashish Gupta
- Dr. Vandana Singh

Visiting Research Engineers

- Mr. Boby C. Villari
- Dr. Girija S. Samal
- Dr. Girija S. Samal
- Mr. Jitesh Bhatia
- Mr. Saswat Bharat
- Dr. Sudesh Bhagwat
- Dr. S. Bhattacharya
- Dr. Unni Narain

Students

Ph.D : 19
M.Tech : 22
B.Tech/ M.Sc.: 15

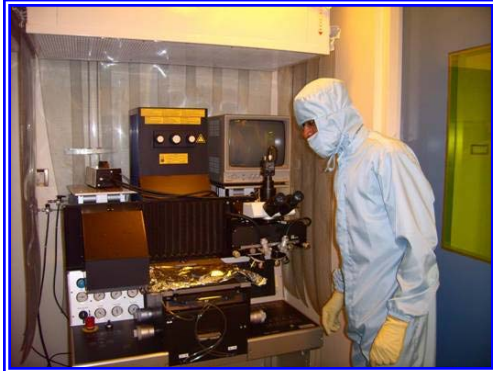
Support Staff

- Mr. Anoop Kumar
- Mr. Dharmendra Swain
- Mr. Dinesh Kumar
- Mr. D.S.Chauhan
- Mr. Ramnath Yadav
-

ISO 6 Clean Room



R&D Processing Facilities



Substrate Cleaning
ITO Deposition
Tailoring Work-function
Spin coating
Vacuum Drying
Vacuum Deposition
Material Handling
Sealing within Glove Box
Research OLED System



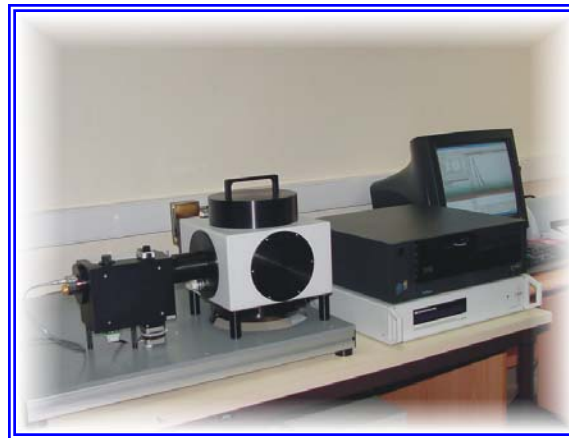
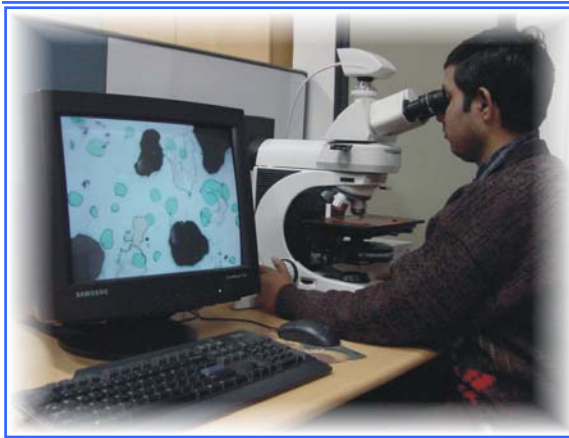
Public domain knowledge inadequate! Must do many small things oneself!!



Characterization

**A VARIETY
OF
RELEVANT
*KNOWLEDGE-
INTENSIVE*
DIAGNOSTICS**

Ready to Sort & Solve



FINANCIAL Profile

Financial Profile:

Annual Grant (Samtel – IITK MOU) - Rs. 22.5 Lakh
Annual Grant (IITK) - Rs. 6.00 Lakh
+ Sponsored Projects

Projects Undertaken by SCDT Faculty

SI No	Project Name	Funding Agency	Amount (Rs. in Lakhs)	Duration
01	Research and Development in the Technology of Active Matrix Organic Light Emitting Diode Displays	DST & Samtel	300.00	2002-2005
02	Molecular Electronics: Fabrication of new photolithography-less vertical organic thin film transistors (OTFTs)	MCIT	37.58	2004-2007
03	UV and Near-UV Light Emitting Diodes using Polysilanes	DST	24.00	2004-2007
04	Development of Prototype Full Color Organic Light Emitting Diodes (OLED) Display	DST & Samtel	1575.00	2005-2008
05	Development of Magnesium Oxide Coatings by Sputtering for Plasma Display Panels	MCIT & Samtel	174.00	2005-2008
06	Fabrication of efficient thin-film organic solar cells based organic/inorganic heterojunction	MHRD	17.50	2005-2008
07	Low Cost and Flexible Solar Cells for Developing Countries	Swiss NSF	101.00	2005-2008
08	Fabrication of efficient thin-film organic solar cells based organic/inorganic heterojunction (2005-2008)	DST	15.00	2005-2008
09	Development of Centre for Nanotechnology (Printable Electronics) at IIT Kanpur	DST	1180.00	2006-2011
10	Development of Next Generation Plasma Display Technology and a 50 inch HDPDP Prototype (Total Project cost Rs. 2430.50 Lakhs, includes Samtel, IIT Kanpur, Allahabad University, CGCRI Kolkata and NPL New Delhi)	CSIR (NMITLI) & Samtel	132.00	2007-2010
11	Samtel Centre for Display Technologies	Samtel Color Ltd	22.50 (Annual)	1999-

Current Projects

- Organic Light Emitting Diodes based Display Devices
- Materials and structures development for Plasma Display Panels
- Solar Cells
- OTFTs towards integration in OLED displays
- Printable electronics
- Sensors

Achievements

- PLED/OLED
- MgO Coatings
- Display Electronics
- OTFT, UV Emitters & Sensors
- Organic Solar Cells
- PDU

Outreach

- Summer course on “Organic Electronics and Displays” are organized annually. This summer, the “Organic Electronics 07” attracted 14 Korean students from Hoseo & Dankook Universities in Korea.
- 9th Asian Symposium on Information Displays ASID’06 , October 8-12, 2006, India Habitat Centre, New Delhi. Over 380 participants including about 120 from abroad attended the Symposium.
- *SID India Chapter* – HQ at SCDT

SCDT Future Directions (Academic Excitement)

- **Novel OLED structures**
- **White OLED**
- **Solar Cells.**
- **TFTs**

OTFT

Transparent TFTs

Silicon TFT

- **Sensors**
organic sensors— bio-diagnostics
chemical sensors

TFTs & AMOLED Display Development

- **TFTs** : Active matrix addressing is necessary to develop marketable organic displays in future. The technology development for thin film transistors is necessary. The work on organic TFT would continue at the research level, TFT research also may be taken to the level of prototype development. Further, exploratory work on oxide based transparent TFTs has been started at the exploratory level.
- **AMOLED Display Development** : Next phase of PDU is planned with the development of amorphous silicon based TFTs for integration with the OLEDs for a full color active matrix OLED display.

Solar Cells

The results on Organic Solar Cells are highly encouraging and the activity will be enhanced to develop solar panels. In particular, the activities on Solar Cells will be established in four major themes:

1. Solar Cell basic device research (*Organic and Nano-Semiconductors*)
2. Solar Cell R&D at prototype level (*Silicon thin films*)
3. Integration of Solar Cells with end-use devices (*Innovative Applications*)
4. Demonstration projects with research on life-time testing and utility integration (*Swimming Pool with solar thermal water heating and photovoltaic electricity*)

Sensors

The work on organic sensors— bio-diagnostics
and chemical will grow

Projects in Pipeline

- **Solid State Lighting – DST (~ Rs. 20 Lakh)**
- **OTFT – DST/MCIT (~ Rs. 60 Lakh)**
- **Development of nanostructured bulkheterojunction organic photovoltaic solar cells - MNRE (~ Rs. 221 Lakh)**
- **Organic Solar Cells (~ Rs. 3 Lakh) Approved, Centre for Innovation, Incubation and Entrepreneurship (CIIE) at IIM Ahmedabad**
- **AMOLED Development – DST-Samtel (~Rs. 600 Lakh)**

Patents, Publications, & Awards

(as of March 2008)

- Patents – 10
- Publications (Refereed Journals) >57
- Conference Presentations > 60
- Recognition of the work carried out at SCDT

URGENT NEEDS AND AREA OF CONCERNS

Manpower:

Over the last eight years, SCDT activities have grown and the sustainability of this interdisciplinary group with a product orientation is established beyond doubt. In addition to the faculty group that shares the usual work load within their own departments, a team of technical and support staff is badly needed to sustain the SCDT. A minimum number of staff that is needed to support the activities is given below.

QUASI-PERMANENT POST REQUIREMENTS

Post Description	Level	Job
1. Process Engineer	one	Research Engineer
2. Resident Chemist	one	Post Doctoral or Equivalent
3. Laboratory Manager	one	Research Scientist
4. Technical Assistants	two	Project Associate
		Technical Assistants
		1. Electronics & Electrical
		2. Mechanical & Workshop
5. Office Manager	one	Project assistant
		Documentation, Liaison
6. Office Help	one	Project Assistant
		Support Services

Space

At present, SCDT has no office space for faculty and scientific personnel. Further, there is a big shortage of storage space. Moreover, the laboratory space created has already been fully utilized. The following planned activities would require additional space on urgent basis:

Printable Electronics (in coordination with nanotechnology centre)

Solar Cells – PDU level activity

TFT – AMOLED integration of OLED with Silicon

TFT Active Matrix

We require about six hundred square meters of Lab space.

URGENT NEEDS AND AREA OF CONCERNS

Industry Participation

Consortium vs Single Industry

(Though starting the SCDT with a single industry (Samtel) has been extremely beneficial to maintain a focus and speed in the research agenda. For long term sustainability, it is imperative to involve other industries keeping in view the preeminent and most favored position of Samtel and conflict of interests that may arise. Videocon Display Research Team has recently visited the SCDT for collaboration on TFT-LCD research. There are several companies (Moser-Baer PV, Signet Solar, Tata BP etc..) that have shown interest to participate in R&D on Solar Cells with the centre. We have yet to find potential partners in sensor activity)

CONCLUDING REMARKS

The major achievement of the SCDT is formation of an interdisciplinary research group having a common shared vision to carry out research and development leading to products that may be commercialized for the benefit of the society.

The SCDT has set-up a unique model of collaboration with the industry and government agencies.

Invitation to share the common vision