

An Overview of Materials Research in Bangladesh

Scopes and Limitations

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Contents

- **Materials Research: Universities and Organizations**
- **Financial Grants for Advance Research**
- **Fields of Study in different institutions in Bangladesh**
- **Materials Research in the Department of Physics, BUET**
- **Facilities available around BUET**
- **Facilities Needed**
- **Concluding Remarks**
- **Recent Publications**
- **About Bangladesh**
- **Acknowledgements**

Materials Research: Universities and Organizations

- ❑ **Government Universities of different disciplines : 22**
- ❑ **Private Universities : 50**

But the following Govt. Universities have limited Materials Research facilities:

- **University of Dhaka**
- **University of Rajshahi**
- **University of Chittagong**
- **Jahangirnagar University**
- **Shahjalal University of Science & Technology (SUST)**
- **Khulna University of Engineering and Technology (KUET)**
- **Bangladesh University of Engineering and Technology (BUET)**

There are Two Government Agencies, which have limited Materials Research facilities :

- **Bangladesh Atomic Energy Commission (BAEC)**
- **Bangladesh Council for Scientific and Industrial Research (BCSIR)**

*****About 150 Scientists and Engineers are involved in Materials Research in the above organisations.**

Financial Grants for Advance Research

- **About TWO million US\$ is allocated by the Ministry of Science, Information and Communication Technology every year for advance research in all the Universities and Government research organisations .**
- **In average, each University gets about ONE hundred thousand US\$ for research.**
- **A small fraction of this fund goes for material research.**
- **Therefore, it is difficult to procure any sophisticated equipment for advance research.**

Fields of Study in different Institutions in Bangladesh

- **Plasma polymerized polymeric thin films**
- **Polymer thick films**
- **Polymer composites**
- **Polymer blends**
- **Ferrites**
- **Colossal magnetoresistive (CMR) materials**
- **Multiferroics**
- **Amorphous magnetic alloys**
- **Barium titanate and Zinc oxide ceramics**
- **Compound semiconductor thin films**
- **Semiconducting Crystals, etc.**

Materials Research in the Department of Physics, BUET

Fields of Research in the Department

❑ Polymereric Materials

Plasma polymerized polymeric thin films, Polymer composites, Polymer blends

❑ Magnetic and Dielectric Materials

Ferrites, CMR materials, Multiferroics, Amorphous magnetic alloys, Ceramics

❑ Semiconducting Crystals

❑ Facilities available in the Department of Physics

➤ Sample preparation:

- Capacitively coupled plasma polymerization set up**
- Vacuum evaporation coating unit for thin film deposition**
- Primary Crystal growth facilities**
- Ball mills, Furnaces, Microbalances, etc.**

➤ **Measurements:**

- A Helium cryostat.
 - A locally fabricated liquid nitrogen cryostat
 - Optical polarizing microscopes
- **Dc electrical measurements:** Keithley Electrometer 614, Keithley microvolt meters, dc power supplies of different ranges
 - **Ac electrical measurements:** Agilent LF Impedance Analyzer (5Hz to 13 MHz) and Agilent HF Impedance Analyzer (1 MHz to 1.8 GHz)
 - **Magnetic measurements:** Magnetization measurement using a Locally fabricated Torque Magnetometer up to 0.7T and Hall effect measurement
- **Faculties:** Prof.-4, Assoc. Prof.-6, Assistant Prof.-1, Lecturer-3
 - **Post Graduate Students:** Ph. D.- 10, M. Phil.- 50



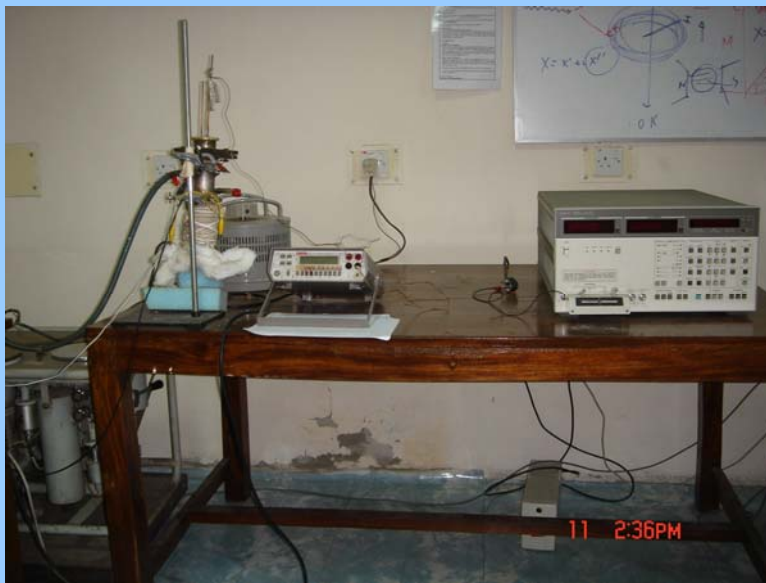
Plasma polymerization system and coating unit



Torque magnetometer



Liquid Helium Cryostat (Donated by Uppsala University, Sweden)



Agilent LF and HF impedance Analyzers (HF IA Donated by Uppsala University)



Temperature Bath for Crystal growth



Liquid Nitrogen Cryostat (Locally Fabricated)

Facilities available around BUET

XRD

IR

UV-VIS-NIR

DTA/TGA

Some mechanical properties measuring facilities, etc.

Facilities Required

□ Sample Preparation facilities:

- Amorphous ribbon
- Nanomaterial
- Advance Crystal growth
- RF plasma enhanced CVD
- Sputtering
- PLD, MBE, etc

□ Measurement facilities

- Thickness
- Elemental analysis
- FTIR
- Raman spectroscopy
- DSC, AES, XPS, EELS, ESR
- SEM/EDX, AFM, TEM
- Magnetisation

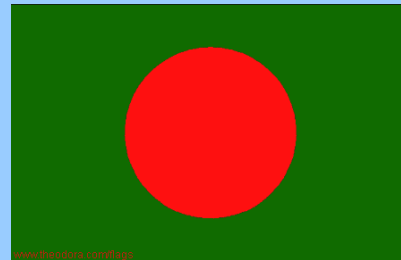
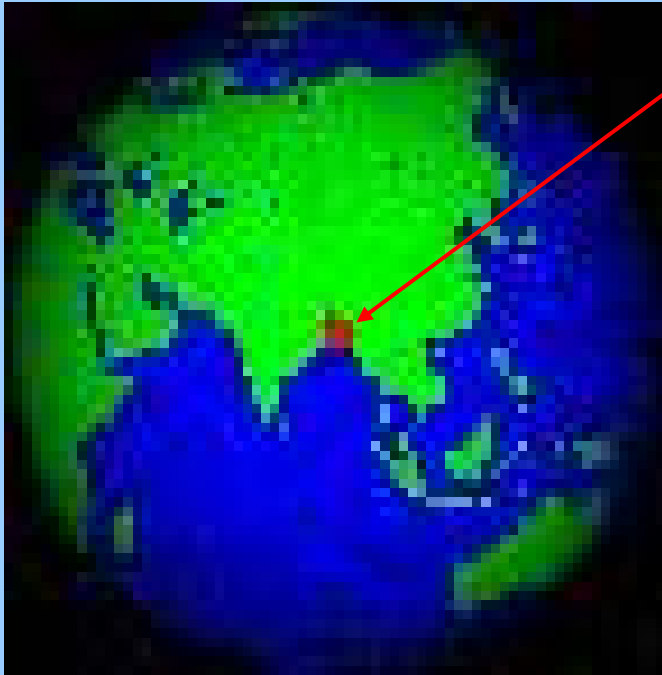
Concluding Remarks

- **The idea of creating a ‘Materials Research Network’ in the South East Asia to promote excellence in material science in the developing countries by Prof. Anthony K. Cheetham of ICMR, University of California, Santa Barbara, USA and Prof. C. N. R. Rao, Bangalore India is an important attempt to encourage the researchers of the developing countries in this region.**
- **In the light of the above discussions, as a party to take advantages of the host laboratories under the frame work of South East Asia materials research network to be formed, it would be a great opportunity of using the facilities of the host laboratories. To materialise such a mission it is essential to get financial and logistic support from the network.**
- **Now it is crucial to find out the ways and means to support the researchers of less well endowed Institutions in the developing countries to conduct research in the host Institutions. I hope that this meet of eminent researchers from different countries will be able to find a solution to the problem to promote the theme of the workshop.**

Recent Publications

1. Electrical and Optical Properties of Plasma Polymerized N, N, 3, 5 Tetramethylaniline Thin Films, H Akther and **A. H. Bhuiyan**, New J. Phys., 7 (2005) 173.
2. Space Charge Limited Conduction in Plasma Polymerized N, N, 3, 5 Tetramethylaniline Thin Films,, H Akther and **A. H. Bhuiyan**, Thin Solid Films, 488 (1-2)/(2005) 93-97.
3. Structural, Electrical and Optical Properties of Copper Selenide Thin Films Deposited By Chemical Bath Deposition Technique, Al-Mamun, A. B. M. O. Islam and **A. H. Bhuiyan**, J. Mater. Sci.: Mater.in Electr., 16(5) (2005) 263 - 268.
4. Infrared and Ultra Violet-Visible Spectroscopic Investigation of Plasma Polymerized N, N, 3, 5 Tetramethylaniline Thin Films, H Akther and **A. H. Bhuiyan**, Thin Solid Films, 474(1-2) (2005) 14 - 18.
5. High Temperature cluster glass state and photomagnetism in Zn and Ti substituted NiFe₂O₄ films Munetoshi Seki, **A.K.M. Akther Hossain**, Tomoji Kawai, and Hitoshi Tabata, Journal of Applied Physics, vol. 97(8),(article no 083541), 6 pages, 15 April, 2005.
6. Photocontrol of magnetization in Al-substituted Fe₃O₄ thin films, Munetoshi Seki, **A.K.M. Akther Hossain**, Tomoji Kawai, and Hitoshi Tabata, Solid State Communications, vol.133, pp791-796, 2005.
7. Magnetoresistive Properties of Gd Doped Lanthanum Strontium Manganites, M.A. Basith, **M Huq**, Journal of Ultrascientist of Physical Sciences, Vol.17, issue 3, December 2005 (in press).
8. Preparation and characterization of CuLnS₂ thin films from aqueous solutions by novel photochemical deposition technique, **Podder J**, Miyawaki T and Ichimura M, J. Crystal Growth Vol 275, p 937-942 (2005).
9. Photochemical deposition of CuxS thin films from aqueous solutions, **Podder J**, Kobayashi R and Ichimura M, Thin Solid films, Vol. 472, p 71-75 (2005).

Bangladesh



National Flag

Name: Peoples' Republic of Bangladesh
Citizenship : Bangladeshi
Capital : Dhaka
Population : 140,000,000
Independence: March 26, 1971 (Eastern part of Pakistan 1947-71)

Geography

- **Size: 144,000 sq-km**
- **Topography: Broad deltaic plain**
- **High hills in the Southeast**
- **Low hills in the Northeast**
- **Modest-elevated high lands in the North and Northwest**



Bangladesh Map

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