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_____ ***Dr. Avijit Paul***

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Short Bio-data:

B.Sc.(1991): ***University of Calcutta***

M.Sc.(1993): ***University of Calcutta***

Ph.D (1999): ***Jadavpur University***

Ph.D. & Post Doc worked at ***Indian Association of Cultivation of Science***

Post doc (1999-2000): ***Inha University, Inchon, South Korea***

Research Experience :

During my Ph.D. works at IACS I was engaged to prepare and characterize some systems of

inorganic oxide glass. I am very much aware about the preparation of phosphate and germanate based glasses. Mainly melt quench technique has been adopted for preparation of glasses. The amorphousness of the samples were tested by XRD and from DTA measurements glass transition temperatures (Tg) were estimated. But my main research works are concerned with the ultrasonic characterization of the samples at different temperatures. Ultrasonic velocity and attenuation have been measured at different temperatures ranging from ambient to liquid nitrogen temperature. The cryostatic arrangement for low temperature measurements were designed by me and constructed in our workshop. The temperature variation attenuation have been interpreted by the thermally activated relaxation process model. But the variation of velocity as a function of temperature could not be explain by the relaxation process alone. I have developed a mathematical model relating the variation of ultrasonic velocity with absolute temperature following a proposed hypothesis in which not only thermally activated relaxation process is considered but also some other phenomena due to the existence of microscopic inhomogeneities resulting from the freezing of the natural fluctuations of the order parameter of liquid glass during glass formation. Now I am engaged to characterize rare earth doped glass samples by ultrasonic, XRD, DTA, DSC, FTIR, electrical conductivity, thermoelectric power and EPR measurements with the help of other laboratories in our institution. To carry out the theoretical calculations all the computer algorithms have been developed by me in both UNIX and Windows environment.

I have worked as a **postdoc fellow** in the **Department of Metallurgical Engineering, Inha University, Inchon, Korea** under supervision of Prof. Chongmu Lee. Initially, I worked on Chromium Carbide hard coating on high speed steel. The crystal structures of the coatings were evaluated using XRD analysis. The surface morphology of the films were estimated by AFM analysis and SEM micrographs. The Salt Fog tests were performed to check the corrosion resistance ability and the hardness of the coatings were estimated using nano indentation technique.

To increase the speed of the ULSI (ultra large scale integrated) circuit, the replacement of aluminum by copper as the interconnect material was a challenging study. Most popular technique of copper deposition is electroplating. For electroplating of copper a seed layer of copper must be deposited on the substrate. The smooth deposition of copper by electroplating technique depends on the level of impurities and the surface roughness of the copper seed layer. I was also engaged to clean oxygen and carbon impurities of the copper seed layer using hydrogen plasma with various plasma power and exposure time followed by rapid thermal annealing at different temperatures. The surface conditions of the samples were measured by AFM and SEM measurements and the impurity levels were estimated from XPS analysis. From the observations we have estimated the optimum cleaning conditions.

List of Publications

1. Ultrasonic study on germanium-rich binary V_2O_5 - GeO_2 glass : Signature of isopaustic character; ***A. Pal***, A. Maiti, S. Mukherjee and C. Basu, J. Mater. Sci. Lett.
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(1996) 329.

2. Ultrasonic study on Ternary PbO-V_2O_5-P_2O_5 glass system ; ***A. Paul***, A. K. Chattopadhyay and C. Basu, J. Acoust. Soc. India
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(1996) section V- 2.1

3. Ultrasonic velocity and attenuation in Pb-phosphate glass ; ***A. Paul***, U. S. Ghosh and C. Basu, J. Non-cryst. Solids
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(1997) 265.

4. Ultrasonic study on binary PbO-V_2O_5 glass system ; ***A. Paul***, S. Mukherjee, A. Maiti and C. Basu ; Solid State Physics (Proc. DAE Solid State Symposium),
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(1997) 218.

5. Ultrasonic investigations of PbO-V_2O_5-P_2O_5 glass ; ***A. Paul***, A. K. Chattopadhyay and C. Basu J. Appl. Phys. **84** (1998) 2513.

6. Temperature dependence of mechanical properties of Bi-phosphate glasses ; P. Roychoudhury, S. Mukherjee, ***A. Paul*** and C. Basu J. Acoust. Soc. Ind. **XXVI** (1998) 128.

7. Acoustic investigations on copper tellurite glasses ; ***A. Paul***, P. Roychoudhury, S. Mukherjee, and C. Basu J. Acoust. Soc. Ind.
XXVI
(1998) 216.

8. Acoustic properties of Lead-vanadate glasses ; ***A. Paul***, A. Maiti and C. Basu. J. Appl. Phys. **86** (1999) 3598.

9. Acoustic Study of Bi_2O_3-P_2O_5 glass ***A. Paul***, P. Roychoudhury, S. Mukherjee and C. Basu Phosphate Research Bulletin (Spcial issue : Proceeding of Third
International Symposium on Inorganic Phosphate Materials, Villeneuve d'Ascq, France)
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(2000) 121.

10. Ultrasonic properties in Pb-vanadate glasses ; ***A. Paul***, A. Maiti and C. Basu, Indian J. Physics, Indian J. Phys. **74A**, 139 (2000).

11. Temperature dependence ultrasonic study of $(CuO)_x(TeO_2)_{(1-x)}$ glass system ; ***A. Paul***, P. Roychoudhury, S. Mukherjee, and C. Basu J. Non-cryst. Solids
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(2000) 83.

12. Study of Ultrasonic Propagation in $(Bi_2O_3)_x(P_2O_5)_{1-x}$ Glass System P.Roychoudhury, ***A.Paul*** ,
C.Basu, S.Mukherjee and K.Goswami, Phys. Chem. Glasses
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(2001)
126.

13. Effects of rapid thermal annealing after plasma H_2 pretreatment of the copper seed layer surface on copper electroplating, Junhwan Oh, Hanseung Lee,
Avijit
Paul

and Chongmu Lee, Jpn.J.Appl.Phys.,
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(2001) 5294.

14. An anomolous behaviour of ultrasonic velocity and attenuation in $(PbO)_x$ $(TeO_2)_{1-x}$ glasses, P.Roychoudhury,
A.Paul
, C.Basu, S.Mukherjee and K.Goswami Phys.
Chem. Glasses,
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, (2002), 147.

15. Microstructure and corrosion studies of chromium carbide deposited on steel by magnetron sputtering, ***A. Paul***, Jongmin Lim, Kyunsuk Choi and Chongmu Lee, Mater. Sci & Engg. B Mater. Sci. & Engg. A,
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(2002) 123

16. Acoustic and Optical properties of $(Li_2O_{0.2-x}$ $(Na_2O)_x$ $(TeO_2)_{0.8}$ glasses, P. Roychoudhury, SudipK.Batabyal, ***A. Paul***, C. Basu, S. Mukherjee and K. Goswami, J.
Appl. Physics,
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(2002) 3530

17. Investigations on Ag_2O doping and crystallization on the properties of lead-vanadate glass, Sudip K. Batabyal, ***A. Paul***, P. Roychoudhury, C. Basu, J. Non-Cryst. Solids,
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(2006)2791

18. Acoustic Study of Nano Crystal embedded $PbO\text{-}P_2O_5$ glass. Sudip K. Batabyal, ***A. Paul***, P. Roychoudhury, C. Basu, Bull. Mater. Sci.
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