Teachers' Academic Profile

1. Name of the Teacher :Hiranmay Pal
2. Designation: SACT-1
3. Qualification:Ph.D.(Jadavpur University)
4. Specialization; Solid State Physics
5. E-mail address:phiramay@gmail.com

6.Date of Joining in W.B.E.S..:Nil

7.Date of joining in this college:06.01.2006

8.Total teaching experience in college level: more or less 19 yrs

9.Research interests: Characterization of microstructures to improve the material's properties

10.Title of thesis (Ph.D.) with year:
" Studies on the microstructure of metals and alloys by X- Ray diffraction and other methods"

I submitted the thesis in the month of September, 1994.
Finally,I was awarded Ph. D. degree in the month of January, 1996.

10.Research Guidance: Two Research Scholars at IACS (Jadavpur) & one at MPI(Stuttgart, Germany)

12. Research Projects:

I completed the following three reseach projects successfully.

Project-1[Completed at IACS(Jadavpur)]:Characterization of the microstructures of metals & alloys.

Field of the work is preparation and characterization of alloys, both in the deformed and as-cast state employing X-ray diffraction, high resolution optical microscopy, scanning electron microscopy, EDAX, differential thermal analysis(DTA), differential scanning calorimetry(DSC), microhardness studies and magnetic property studies.

The major part of the work done is characterization in the cold-worked state of corrosion resistance(Cu-Al-Fe), age-hardenable (Cu-Ni-Sn,Al-Zn-Cu) and Zn-Cu-Ag alloys employing X-ray diffraction line profile analysis(XRDLPA). The microstructure in the cold-worked state of the materials is characterized by several parameters such as stacking faults(intrinsic,extrinsic and twin types), small change in cell dimension, residual stress,coherent domain sizes, dislocation density, stacking fault energy etc which were estimated quantitatively by XRDLPA applying Warren and Averbach method.

Ageing studies were done employing X-ray, DTA,DSC and microhardness studies and different phases were identified by suitable softwere of E.Wu. Compositions of the phases were determined by EDAX.

Microstructure was studied directly by high resolution optical and scanning electron microscopy to reveal the development of grain structure, grain boundaries, precipitates etc. Micrographs of some alloys revealed slip lines, martensites, dendritic structure, widmanstatten pattern. Solute dependence of these aspect of microstructural developments of the materials was studied and compared with earlier X-ray studies.

Microhardness studies of the materials were undertaken using Vickers hardness tester to correlate the microstructure with hardness and study on magnetic property of magnetic materials was undertaken using sample vibrating magnetometer.

In conclusion, the microstructural features as revealed from the above studies were correlated with the mechanical and magnetic properties.

Project-2[Completed during my stay at NRIM(Japan)]:Martensitic transformations at room temperature in super high magnetic field

I was engaged in research work as a STA Fellow for one year (from Jan.17,1996 to Jan.16,1997) at National Research Institute for Metals in Japan. The subject of research was studies of transformation texture in Fe-base alloys by X-ray Pole Figure method . For this purpose, we first prepared austenitic textured specimens by heavy cold-rolling and subsequent low temperature annealing then the specimens were isothermally transformed at low temperature(77K/110K).

Effects of super magnetic fields on martensitic transformation were extensively studied, using Fe-Ni-Mn and Fe-Ni-Mn-C alloys with various alloy compositions. Both pulse(with 40ms duration) and stationary magnetic fields upto 22 MA/m were applied to these alloys at room temperature. It is interesting that by applying a stationary magnetic field of 17.5 MA/m for two hrs, perfectly austenitic specimens of Fe-23Ni-3.6Mn and Fe-23Ni-3.8Mn(mass%) alloys were isothermally transformed into martensite as much as 60-80%(volume) at room temperature . The nose temperature of TTT curves in these two alloys are 170K 150K, respectively. On the other hand, application of pulse magnetic fields upto 22MA/m has not induced any appreciable amount of martensite in these alloys. Effects of external stress and high magnetic field on transformation textures were also examined in detail. Orientation relations between austenite and martensite were also examined from the pole figures.

Project-3[Completed at IACS(Jadavpur)in the session 1997-98]:Studies of microstructures
by Rietveld method

I have a remarkable success to evaluate microstructural parameters (fundamentally important) of isothermally transformed Fe-Ni-Mn alloys by Rietveld's Whole Profile Fitting Method correcting intensity of the X-ray Profile due to preferred orientations by March and Dollase equation.

Project-4[Started at MPI(Stuttgart, Germany)in 1998]:Nanocrystalline Materials
I was engaged in the research project as a Post Doctoral Fellow at Max Planck Institute for Metals Research in Stuttgart (Germany).
Project-5[Future Expectation]:Solutions of the problems associated with wave Mechanics
13. List of Publications:

1.Characterisations of Deformed and As-cast Microstructure of Copper-Aluminium-Iron Alloys((α-phase)

Hiranmay Pal et al.
Jpn. J. Appl. Phys.,32, 1164-1170(1993)

2.Correlation of Microstructure with Mechanical Property of Silicon-Bronze in the α and (α+γ)-Phase

Hiranmay Pal et al.
Indian Journal of Physics, 68A, 239-246(1994)

3.Microstructural Characterisation of Hexagonal (Ag,Cu)Zn4 Alloys in the Deformed and As-cast State

Hiranmay Pal et al.
Jpn. J. Appl.Phys., 33, 1443-1449(1994)

4. Characterisation of the Microstructure of Deformed Al-Zn-Cu Alloys by X-ray Diffraction Line Profile Analysis

Hiranmay Pal et al.
Metall. Mater. Trans., 26A, 1011-1013(1995)

5. Microstructure and Phase Transformation Study of Al-Zn-Cu alloys

Hiranmay Pal et al.
Mater. Trans., JIM, 36, 490-495(1995)

6. Microstructure and Phase-Transformation Studies of Cu-Ni-Sn Alloys

Hiranmay Pal et al.
Jpn. J. Appl. Phys.,34, 1619-1626 (1995)

7. Characterisation of Deformed and As-cast Microstructure of Copper-Aluminium-Iron Alloys: Influence of Increased Fe Solute (α+β-phase)

Hiranmay Pal et al.
Jpn. J. Appl. Phys., 35, 1836-1841(1996)
8.Correlation of Microstructure with Mechanical Property of Cu-Si-Mn alloys

S.K.Shee,H.Pal,S.K.Pradhan and M.De
Materials Engineering, 7, 431(1996)
9. Characterisation of microstructure of isothermal martensite in Fe-23Ni-3.8Mn by Rietveld method

H. Pal et al.
J. Alloys Comp., 278, 209-215(1998)

10. Characterisation of microstructure of isothermal martensite formed at low temperature in powder of Fe-23Ni-3.3Mn alloy by Rietveld method

A.Chanda, H. Pal, M. De, S. Kajiwara, T. Kikuchi
Materials Science and Engineering A, 265, 110-116(1999)

14. Membership of Learned Societies /Editorial Boards, etc.: (a). Life Member of Materials Research Society of India(MRSI)
(b)Life Member of Indian Physical Society(IPS)
15.Patents:Nil

16.Awards:I was awarded STA Fellowship by Research Development Corporation of Japan (JRDC) in 1995 for the Post Doctoral Research at National Research Institute for Metals(Tsukuba, Japan). I was also invited for the engagement in the project lying in the area of nanocrystalline materials at Max Planck Institute for Metals Research.

!7. Other Notable Activities :International Centre for Diffraction Data(ICDD) accepted the powder pattern of the material(Copper Silver Zinc) prepared by me for the Powder Diffraction File.

My name has been recommended to the American Biographical Institute's governing Board of Editors for biograpghical inclusion in the International Directory of Distinguished Leadership.

18. Participation (Specify no.)
(Seminar/conference/Symposium): More or less 22

Contributions to Academic Conferences:

1.Stacking faults as determined by XRPD and its correlation with mechanical property for some ternary industrial alloys

H. Pal,S.K.Pradhan,M.De
Proc. Of the III School on X-ray Diffraction from Polycrystalline materials, University of Trento, Trento, Italy, February, 1994

2.Transformation textures produced by cold-roll and their recrystalization textures in Fe-Ni-Mn and Fe-Ni-Mn-C alloys

T. Kikuchi, H. Pal, S. Kajiwara and E. Furubayashi
Autumn Meeting of the Japan Institute of Metals (Abst. No.137), Hokkaido University, Sapporo, Japan, September,1996

3.Transformation textures of isothermal martensite induced under uniaxial stress in Fe-Ni-Mn and Fe-Ni-Mn-C alloys

H. Pal, T. Kikuchi, S. Kajiwara and E. Furubayashi
Autumn Meeting of the Japan Institute of Metals (Abstr. No. 138), Hokkaido University, Sapporo, Japan, September, 1996
H. Pal, M. De and A. K. Pal
Accepted for IUCr Congress99 in Glassgow(U.K)
4. Textures of martensite transformed isothermally under uniaxial stress-Computer Simulation-

S. Kajiwara, E. Furubayash, H. Pal and T. Kikuchi
Autumn Meeting of the Japan Institute of Metals (Abstr. No.139), Hokkaido University, Sapporo, Japan, September,1996

5. Martensitic transformation in Fe-Ni-Mn and Fe-Ni-Mn-C alloys at room temperature under super high magnetic field

S. Kajiwara , T. Kikuchi, H. Pal, T. Asano, M. Yuyama, K. Inoue, H. Wada and M. Kosuge
Autumn Meeting of the Japan Institute of Metals (Abstr. No. !43), Hokkaido University, Sapporo, Japan, September, !996

6. Transformation texture of isothermal martensite formed at room temperature under high static magnetic field

S. Kajiwara, T. Kikuchi,H. Pal, E. Furubayashi and H. Wada
Spring Meeting of the Japan Institute of Metals (Abstr. No. 108), Science University of Tokyo, Tokyo,March, 1997

7. Simulation of X-ray Diffraction Pattern of CuInxGa1-xSe2 Thin Films by Rietveld Method
H.Pal, M.De, A.K.Pal
Accepted for IUCr Congress 99 in Glassgow