LECTURE NOTES

INTENSIVE COURSE - CLTPP-2

SOCRATES / ERASMUS

Course on Low Temperature Plasma Physics and Applications

Eindhoven, The Netherlands
July 3-9, 1997

Master Class on Plasma Deposition
July 10-11, 1997

Support:

Erasmus/Socrates

CPS
CENTRUM VOOR PLASMAFYSICA EN STRALINGSTECHNOLOGIE

Graduiertenkolleg HTPP

Arbeitsgemeinschaft Plasmaphysik (APP)

Eindhoven tu University of Technology

Department of Applied Physics

Bring this sheet with you for receiving the lecture notes of the course

F.J. de Hoog	
D.C. Schram	
C. Ferreira	
J.A.M. van der Mullen	
M. Schmidt	
W.J. Goedheer I	
S. Longo	
W.J. Goedheer II	
J. Winter I	
M. Fitaire	
P. Fauchais I	
P. Fauchais II	
P. Fauchais III	
A. Gleizes	
A. Ricard I	
A. Ricard II	
Ch. Hollenstein	
J. Uhlenbusch	
H.F. Döbele	
N. Sadeghi I	
G.M.W. Kroesen	
M.C.M. van de Sanden I	
Master Class	
J. Winter II	
N. Sadeghi II	
W.J. Goedheer III	
A. Bouchoule	
M.C.M. van de Sanden II	
W. Jacob	

Program:

Thursday, July 3:

08.15 - 08.45	Student registration
09.45 - 09.15	Welcome and short introduction *F.W. Sluijter, D.C. Schram*
09.15 - 10.45	Introduction, gasdicharge principles, similarity and stability, discharge types *F.J. de Hoog*
11.15 - 12.45	Fundamentals, Debye character, collisions with neutrals, coulomb collisions, inelastic collisions, ionization, excitation mean free paths, time constants, magnetic field confinement, Hall parameters, cyclotron resonance. *D.C. Schram*
14.00 - 15.30	Electron kinetics, processes, electon energy distributions (incl. Maxwell etc.), transport properties *C. Ferreira*
16.00 - 17.30	Excitation and radiation in atomic plasma, collisional radiative models, line and continuum radiation, influence of molecules *J.A.M. van der Mullen.*

Friday, July 4:

09.00 - 10.30	Plasma production, plasma sources: DC glow, RF plasma capacitive, inductive, surfatron, helicon, ECR, microwave plasmas *M. Schmidt*
11.00 - 12.30	RF discharges, electron distribution functions, D.C. potentials, ion energy distribution, charge exchange collisions. *W.J. Goedheer*
14.00 - 15.30	RF discharges, electron kinetics, particle in cell/ Monte Carlo models *S. Longo*
16.00 - 17.30	Hydrodynamic models, numerical problems. *W.J. Goedheer*
19.00	Course Dinner

Saturday, July 5:

09.00 - 10.30	Surface processes, reflection, absorption, desorption polymerization, abstraction. *J. Winter*
11.00 - 12.30	Breakdown phenomena, starting of discharge *M. Fitaire*
Saturday afternoon	free for shopping etc..

Sunday, July 6: **Excursion/day off**

Monday, July 7:

09.00 - 10.30 Thermal plasmas, fundamentals, characteristic lenghts, distribution functions, equilibrium, radiation etc..
P. Fauchais

11.00 - 12.30 Thermal plasmas, generation, arcs etc., RF discharges, inductive, cap. torch design.
P. Fauchais

14.00 - 15.30 Application, cutting, welding etc..
P. Fauchais

16.00 - 17.30 Radiation and spectroscopy in thermal plasmas
A. Gleizes

Tuesday, July 8

09.00 - 10.30 Kinetics in molecular plasmas, dissociation, ro-vibrational excitation, influence on charge density and distribution functions
A. Ricard

11.00 - 12.30 Electron kinetics, processes in H_2, N_2 (0_2) plasmas
A. Ricard

14.00 - 15.30 Plasma diagnostics I
probes, interferometry, mass spectrometry, emission and absorption spectroscopy.
Ch. Hollenstein

16.00 - 17.30 Plasma diagnostics II
Thomson scattering, Rayleigh scattering, CARS
J. Uhlenbusch

Wednesday, July 9:

09.00 - 10.30 Plasma diagnostics III
TALIF, VUV spectroscopy
H.F. Döbele

11.00 - 12.30 Plasma diagnostics IV
LIF, velocity measurements, cavity ringdown
N. Sadeghi

14.00 - 15.30 Radical interactions, infrared spectroscopy
G.M.W. Kroesen

16.00 - 17.30 Etching and deposition mechanisms in plasmas
M.C.M. van de Sanden

17.30 - 18.00 Conclusions, summing up, closure.

Wednesday, July 9/Thursday, July 10

Return home in case of no participation to master class

Master Class on Plasma Deposition Mechanisms

Thursday, July 10

09.00 - 10.30 In and ex situ analysis of thin films
J. Winter

11.00 - 12.30 Radical measurements
N. Sadeghi

14.00 - 15.30 VHF deposition a-Si:H, frequency dependence, a/γ regimes
W. Goedheer

16.00 - 17.30 Powder formation
A. Bouchoule

Friday, July 11

08.30 - 10.00 Deposition mechanisms, a-Si:H deposition
M.C.M. van de Sanden

10.30 - 12.00 Deposition mechanisms, a-C:H deposition
W. Jacob

12.00 - 12.45 Discussion on deposition mechanisms and closure.

12.45 - 14.00 Lunch.

Friday, July 11

Return home