

2nd International Symposium on Incoherent Light Sources

Enschede, Netherlands
9 – 12 April 1979

ISBN: 978-1-5108-4080-5

Printed from e-media with permission by:

Curran Associates, Inc.
57 Morehouse Lane
Red Hook, NY 12571



Some format issues inherent in the e-media version may also appear in this print version.

Copyright© (1979) by Foundation for the Advancement of the Science & Technology of Light Sources (FAST-LS) All rights reserved.

Printed by Curran Associates, Inc. (2017)

For permission requests, please contact Foundation for the Advancement of the Science & Technology of Light Sources (FAST-LS) at the address below.

Foundation for the Advancement of the Science & Technology of Light Sources
FAST-LS
Belmayne House
99 Clarkehouse Road
Sheffield, United Kingdom
S10 2LN

www.fast-ls.org

Additional copies of this publication are available from:

Curran Associates, Inc.
57 Morehouse Lane
Red Hook, NY 12571 USA
Phone: 845-758-0400
Fax: 845-758-2633
Email: curran@proceedings.com
Web: www.proceedings.com

4. PROGRAMME

MONDAY 9 APRIL 1979

8.30 - 11.00 *REGISTRATION AND COFFEE*

11.00 *OPENING OF THE SYMPOSIUM*

– Prof.dr. I.W. van Spiegel; Rector Magnificus of the THT.
Chairman: – Prof. J.F. Raffle, PhD, on behalf of the organizing committee.

11.15 *INVITED PAPER*

LIGHT SOURCE TECHNOLOGY 1979 - A REVIEW,
Dr. J.F. Waymouth, GTE Sylvania Inc. Danvers, Mass. 01923, U.S.A.

12.15 *LUNCH IN THE BASTILLE-RESTAURANT (Campus - Centre)*

SESSION 1 HIGH PRESSURE DISCHARGES 1

Chairman: Dr. M.A. Cayless, Thorn Lighting Ltd., Leicester, U.K.

13.30 *INVITED PAPER*

THE DESIGN OF HIGH PRESSURE DISCHARGE LIGHT SOURCES.
Dr. R.J. Zollweg, Westinghouse R. & D. Center, Pittsburgh, Pennsylvania, U.S.A.

CONTRIBUTED PAPERS ON HIGH PRESSURE SODIUM (Na)-DISCHARGES

14.15 1 SOME IMPORTANT FACTORS IN DESIGN OF A COLOR IMPROVED HIGH PRESSURE SODIUM LAMP,
Ranbir S. Bhalla, Westinghouse Electric Corp., Bloomfield, N.J. 07003, U.S.A.

14.30 2 TOTAL EMITTANCE MEASUREMENT OF ARC TUBES IN HIGH PRESSURE SODIUM LAMPS,
E.F. Wyner, GTE Sylvania, Danvers, MA 01923, U.S.A.

14.45 3 DETERMINATION OF THE SODIUM AND MERCURY VAPOUR PRESSURE IN HIGH PRESSURE SODIUM LAMPS,
J.J. de Groot and J.A.J.M. van Vliet, Philips Lighting Division, Eindhoven, The Netherlands.

15.00 *TEA/COFFEE*

CONTRIBUTED PAPERS ON METAL HALIDE DISCHARGES

15.20 4 A NEW APPROACH TO THE DESIGN OF SODIUM/SCANDIUM HALIDE DISCHARGE LAMPS FOR GENERAL LIGHTING SERVICE,
S.A.R. Rigden, GEC Ltd., Hirst Research Centre, Wembley, Middx, U.K.

15.35 5 LOW POWER, HIGH PRESSURE, METAL HALIDE DISCHARGE LAMP,
K.E. Brown and A.G. Chalmers, Thorn Lighting Ltd., Research and Engineering Laboratories, Leicester LE4 7PD, U.K.

12

e Book shop

The book shop is housed in the Vrijhof (map no. 2, building no. 22, south-eastern part of the groundfloor and sells all kinds of books (also in English, German and French), stationery, magazines and newspapers.

The book shop is open during weekdays from 9 am. - 13.30 and from 14.00 - 17.00 pm.

f University library

The central university library is on the first floor of the building 'Vrijhof' (map no. 2, building no. 22, north-western part). The library is open for anyone during weekdays from 8.15 am. - 22.00 pm. In the library is also a newspaper-corner, where you can find newspapers as there are:

- Le Monde
- Daily Mirror
- Die Zeit
- Le Figaro
- Herald'Tribune
- Neue Zürcher Zeitung
- The Observer
- Frankfurter Allgemeine
- The Guardian
- The Jeruzalem Post

g Copying Facilities for reproduction of papers(A4)

In the central hall of the library a dry-copying-equipment* is available. A 25-cents-coin is needed for 1 copy each.

* Rank Xerox 3100

PLEASE DO NOT FORGET TO RETURN YOUR KEY BEFORE LEAVING TWENTE

- 15.50 6 METAL HALIDE LAMPS WITH MOLECULAR RADIATION SPECTRUM,
G.S. Sarytchev, G.A. Naraikina, L.B. Prikupets, G.N. Gavrilkina, Moscow, USSR.
- 16.05 7 CHARACTERIZATION OF DIFFUSE AND CONSTRICTED HIGH PRESSURE ARCS BY MAGNETIC BALANCING,
P.C. Drop and W.J. van den Hoek, Philips Lighting Division, Eindhoven, The Netherlands.
- 16.20 8 A METHOD FOR DETERMINING THE TOTAL ACCUMULATED BURNING TIME OF LAMPS,
Vincent D. Meyer, Paul L. Fortucci and Elliot F. Wyner, GTE Sylvania, Danvers, MA 01923, U.S.A.
- 16.35 9 HIGH PRESSURE ELECTRODELESS MICROWAVE DISCHARGES AS LIGHT SOURCES,
Paul O. Haugsjaa, Robert J. Regan, William H. McNeil and Alfred E. Feuersanger, GTE Laboratories, Inc., Waltham, Mass. 02154, U.S.A.
- 16.50 *CLOSURE OF THE FIRST-DAY-SESSIONS*
- 17.00 *BUS DEPARTURE FROM THE LECTURE HALL FOR ENSCHEDE TOWN HALL*
- 17.30 *RECEPTION FOR SYMPOSIUM VISITORS BY THE BURGOMASTER OF ENSCHEDE, Mr. H. Wierenga
To be held at the Town Hall, Langestraat 24, Enschede.*
- 18.45 *BUS DEPARTURE FROM THE TOWN HALL FOR THE BASTILLE (Campus of the University)*
- 19.00 *DINNER AT THE BASTILLE-RESTAURANT*
- 20.00 *BAR AVAILABLE AT THE BASTILLE*

TUESDAY 10 APRIL 1979

SESSION 2 HIGH PRESSURE DISCHARGES 2

Chairman: Dr. J.F. Waymouth, GTE Sylvania Inc., Danvers, Mass. 01923, U.S.A.

9.00 *INVITED PAPER*
SYNCHROTRON RADIATION,
Prof.Dr. H.L. Hagedoorn, Technische Hogeschool Eindhoven, Dept. of Applied
Physics, Eindhoven, The Netherlands.

CONTRIBUTED PAPERS ON MODEL STUDIES

9.45 10 CALCULATION OF RADIATION ENERGY TRANSPORT IN
OPTICALLY THICK HIGH PRESSURE DISCHARGES,
B.F. Jones*, D.A.J. Mottram* and G. Eardley**
* Thorn Lighting Ltd., Research and Engineering Laboratories, Leicester LE4
7PD, U.K.
** School of Mathematics, Computing and Statistics, The Polytechnic, Leicester.

10.00 11 CALCULATIONS OF THERMAL CONDUCTIVITY AND OF THE
EFFECTS OF RADIAL DIFFUSION OF ENERGY TRANSPORT IN
HIGH PRESSURE DISCHARGES,
D.A.J. Mottram and B.F. Jones, Thorn Lighting Ltd., Research and Engineering
Laboratories, Leicester LE4 7PD, U.K.

10.15 12 FREE CONVECTION AND QUARTZ WALL TEMPERATURES OF
HORIZONTAL HIGH PRESSURE MERCURY ARCS,
D.K. McLain and R.J. Zollweg, Westinghouse R. & D. Center, Pittsburgh, PA,
U.S.A.

10.30 13 EFFECT OF THE FREE CONVECTION ON THE TEMPERATURE
DISTRIBUTION IN A WALL-STABILIZED HORIZONTAL ARC,
T. Vicsek, Institute for Technical Physics of the Hungarian Academy of Sciences,
H-1325 Budapest, Hungary.

10.45 *COFFEE*

CONTRIBUTED PAPERS ON METAL HALIDE DISCHARGES

11.15 14 DIAGNOSTIC STUDY OF A DyI3/Hg-ARC PLASMA
W.J. van den Hoek and J.A. Visser, Philips Lighting Division, Eindhoven, The
Netherlands.

11.30 15 STUDY OF THE Na-D AND THE TI 535 nm-LINES EMITTED
FROM A HIGH PRESSURE MERCURY DISCHARGE WITH SODI-
UM AND THALLIUM IODIDE AS ADDITIVES,
H.P. Stormberg, Philips GmbH Forschungslaboratorium - Aachen, Aachen, B.R.D.

- 11.45 16 SOME ASPECTS OF HEAT BALANCE IN METAL-HALIDE LAMPS,
D.C. Fromm, J. Seehawer and W.J. Wagner, OSRAM-Forschung, 8000 München,
90, PF 90 06 20, B.R.D.
- 12.00 17 CATAPHORESIS IN METAL HALIDE ARCS,
H. Beyer*, W. Funk** and H.G. Kloss*,
* Akademie der Wissenschaften der D.D.R., IT 111, Berlin, D.D.R.
** VEB Kombinat NARVA Berlin/D.D.R.
- 12.15 18 EFFECT OF AXIAL SEGREGATION ON THE ELECTRIC FIELD
STRENGTH IN 50 Hz Hg-Tl-I-DISCHARGES,
J.J. Damelin-court, J. Salon, M. Sevigne, M. Aubes*, Centre de Physique
Laboratoire associé au CNRS, Université Paul Sabatier, Toulouse, France.
* Laboratoire de Physique des Milieux Ionisés, Université Paul Sabatier, Toulouse,
France.
L. Scoarnec and P. Herbet, Compagnie des Lampes, Centre Technique, 7 Quai
National, Puteaux, France.
- 12.30 19 COMPUTATION OF RELATIVE VARIATION OF NET EMISSION
COEFFICIENT IN TWO Hg-Tl-I DISCHARGES,
J.J. Damelin-court, J. Salon, Centre de Physique Atomique, Laboratoire Associé
au CNRS, Université Paul Sabatier, Toulouse, France.
L. Scoarnec and P. Herbet, Compagnie des Lampes, Centre Technique, 7 Quai
National, Puteaux, France.
- 12.45 *LUNCH IN THE BASTILLE-RESTAURANT*
- SESSION 3 **LOW PRESSURE DISCHARGES; SOLID STATE LIGHT SOURCES**
- Chairman:* Dr. M. Koedam, Philips Lighting Division EDW1, Eindhoven, The Netherlands.
- 14.15 *INVITED PAPER*
LOW PRESSURE DISCHARGES,
Dr. A.G. Jack, N.V. Philips Lighting Division EDW2, Eindhoven, The Netherlands.
- CONTRIBUTED PAPERS ON LOW PRESSURE DISCHARGES*
- 15.00 20 HOMOGENEOUS RECOMBINATION STRUCTURES IN DEPLE-
TED DISCHARGES (LOW PRESSURE SODIUM),
J. Hasker, Philips Research Laboratories, Eindhoven, The Netherlands.
- 15.15 21 PHYSICAL PHENOMENA ON ELECTRODES AND NEAR ELEC-
TRODE REGIONS IN LOW PRESSURE GAS DISCHARGE LAMPS,
E.V. Okhonskaya, Mordovian State University named after N.P. Ogarev, Saransk,
U.S.S.R.
- 15.30 22 A CIRCUIT FOR DIMMING FLUORESCENT LAMPS WITH HIGH
AND LOW RESISTANCE CATHODES,
D.F. Chapman, Thorn Lighting Ltd., Research and Engineering Laboratories,
Enfield, U.K.

- 15.45 *TEA/COFFEE*
- CONTRIBUTED PAPERS ON LIGHT MEASUREMENT AND AP-
PLICATION*
- 16.15 23 THE PHOTOMETRY OF INCANDESCENT LIGHT-SOURCES; THE
RECENT DEVELOPMENTS AND THE CHANGES TO THE PHO-
TOMETRY SI-UNITS IN THE NEAR FUTURE,
A.H.C. van Meijgaard, Technische Hogeschool Twente, Dept. of Applied Physics, Enschede,
The Netherlands.;
- 16.30 24 APPLICATION PARAMETERS OF A LIGHT SOURCE; LUMINOUS
EFFICACY VS. COLOUR RENDERING,
J.J. Opstelten, Philips, Eindhoven, The Netherlands.
- 16.45 25 PRIME-COLOUR LIGHT SOURCES,
W.A. Thornton, Westinghouse Electric Corporation, Bloomfield, New Jersey, U.S.A.
- 17.00 26 MAPPING OF GaP LEDs PROPERTIES ON POLYCRYSTALLINE
SSD SUBSTRATES,
D. Nohavica, Institute of Radioengineering and Electronics, Czechoslovak Academy of
Sciences, Lumumbova 1, 18251 Praha 8, Czechoslovakia.
- 17.15 27 COLOR ELECTROLUMINESCENCE FROM ZnS THIN FILMS MUL-
TI-DOPED WITH RARE-EARTH IONS,
S. Kurita, S. Takahashi, T. Sakaguchi, Faculty of Engineering, Keio University, Yokohama,
Japan.
- 17.30 *CLOSURE OF THE SECOND-DAY-SESSIONS
BAR AVAILABLE AT THE BASTILLE*
- 18.30 *DINNER AT THE BASTILLE-RESTAURANT*
- 20.00 *BOWLING ALLEY AND BAR AVAILABLE AT THE BASTILLE*

WEDNESDAY 11 APRIL 1979

SESSION 4 **INCANDESCENT LIGHT SOURCES**

Chairman: Prof. E. Kauer, Philips Forschungslaboratorium Aachen, Aachen, B.R.D.;

9.00 *INVITED PAPER*
INCANDESCENT LAMPS,
Dr. L. Bartha, Institute for Technical Physics of the Hungarian Academy of Sciences.

9.45 28 *CONTRIBUTED PAPERS*
MORPHOLOGICAL EFFECTS OF TUNGSTEN FILAMENTS IN
HALOGEN LAMPS: THEIR INFLUENCE ON THE TEMPERATURE
DISTRIBUTION AND EVIDENCE FOR HOT SPOT GROWTH BY
DIFFERENT FACETTING,
S. Garbe, Philips Forschungslaboratorium Aachen, Aachen, B.R.D.

10.00 29 CALCULATION ON THE DEVELOPMENT OF HOT SPOTS IN
STRAIGHT WIRE TUNGSTEN FILAMENTS CAUSED BY AXIAL
MASS TRANSPORT,
J.J.F. Geijtenbeek, Philips Lighting Division, Eindhoven, The Netherlands.

10.15 30 MIGRATION OF CARBON IN LINEAR TUNGSTEN HALOGEN
LAMPS,
I. Connor, BSc MSc, Thorn Lighting Limited, Research and Engineering Laboratories, Leices-
ter, LE4 7PD, U.K.

10.30 *COFFEE*

11.00 31 *CONTRIBUTED PAPERS*
THE ROLE OF METALLIC IMPURITIES IN THE LINEAR QUARTZ
BROMINE LAMPS,
L.N. Yannopoulos and A.L. Wolfe, Westinghouse Research & Development Center, Pitts-
burgh, Pennsylvania, U.S.A.

11.15 32 ANALYSIS OF TUNGSTEN COMPOUNDS IN THE WALL REGION
OF BROMINE HALOGEN LAMPS,
P. Eckerlin and S. Garbe, Philips Forschungslaboratorium Aachen, Aachen, B.R.D.

11.30 33 EVALUATION OF THERMODYNAMIC DATA OF TUNGSTEN
BROMIDES AND OXYBROMIDES AT HIGH TEMPERATURES,
G. Dittmer and U. Niemann, Philips Forschungslaboratorium Aachen, Aachen, B.R.D.

11.45 34 TAIL EROSION IN HALOGEN INCANDESCENT LAMPS: KINE-
TICS OF THE W-Br-O-H-SYSTEM,
G. Rouweler and B.J. de Maagt, Philips Lighting Division, Eindhoven, The Netherlands.

12.00 35 GETTERING OF INCANDESCENT LAMPS BY A CHEMICAL CON-
VERSION TECHNIQUE,
J.H. Singleton, Westinghouse R. & D. Center, Pittsburgh, Pennsylvania 15235 U.S.A.

- 12.15 *CLOSURE OF THE THIRD-DAY-SESSION*
- 12.20 Group 1*, bus departure for the excursion to the Radiotelescope ground station at Hooghalen (2 hours traveling by bus; a lunch-packet will be served during the tour).
- 12.45 Group 2* and 3* lunch in the Bastille-Restaurant.
- 14.15 Group 2, bus departure for the excursion to the International Institute for Aerial Survey and Earth Sciences (ITC) at Enschede.
- Group 3, bus departure for the excursion called "TWENTE TOUR", a sight-seeing tour through the surroundings.
- 20.00 *SYMPOSIUM DINNER AT THE ITC-GUESTHOUSE ENSCHEDE.*

* The groups will be composed during the symposium.

THURSDAY 12 APRIL 1979

SESSION 5 **INCANDESCENT LIGHT SOURCES; MATERIALS**

Chairman: Dr. L. Bartha, Hungarian Academy of Sciences.

9.00 ***INVITED PAPER***
LAMP MATERIALS

Dr. J.R. Coaton, Thorn Lighting Ltd., Leicester LE4 7PD, U.K.

9.45 36 ***CONTRIBUTED PAPERS ON INCANDESCENT LIGHT SOURCES***
**ENERGY SAVINGS FOR AN INCANDESCENT LAMP FILAMENT
IN A RADIATION REFLECTIVE SURROUND,**

J. Brett, R. Fontana, J. Parascandola, W. Thouret, P. Walsh, S. Spura and L. Thorington,
Duro Test Corporation, North Bergen, New Jersey, U.S.A.

10.00 37 **SAG AND TILT OF INCANDESCENT COILS AT COMPARATIVE-
LY HIGH TEMPERATURES,**

H. Brons, W. van Hoorn and K.C. Thompson, Philips Lighting Division, Eindhoven, The
Netherlands.

10.15 38 **A FIELD-ION MICROSCOPE STUDY OF THE MICROSTRUCTURE
OF TUNGSTEN FOLLOWING HELIUM ION IMPLANTATION,**
J.M. Walls and R.J.K. Nicholson, Department of Physics, Loughborough University of Tech-
nology, Loughborough, Leicestershire, U.K.

CONTRIBUTED PAPERS ON MATERIALS

10.30 39 **PASSIVATION LAYER OF ALUMINIUM FLUORIDE PROTECTS
FUSED QUARTZ LAMP ENVELOPES FROM ATTACK BY FLUO-
RINE,**

J.R. Fitzpatrick and V.W. Goddard, Thorn Lighting Ltd., Research and Engineering Labora-
tories, Leicester LE4 7PD, U.K.

10.45 ***COFFEE***

11.15 40 **SINTERED YTTRIA FOR LAMP ENVELOPES,**

W.H. Rhodes, GTE Laboratories, Inc., Waltham, Mass. 02154, U.S.A.

11.30 41 **ANALYSIS OF HIGH PURITY METAL IODIDES FOR DISCHARGE
LAMPS,**

L. Bruninx-Poesen and G. Solleveld, Philips Lighting Division, Eindhoven, The Netherlands.

11.45 42 **NEW GETTERING ALLOYS FOR DISCHARGE LAMPS,**

E. Rabusin and M. Borghi, SEAS Getters S.p.A., 20151 Milan, Italy.

12.00 43 **GASEOUS FLUORESCENCE AND VACUUM ULTRAVIOLET
EXCITATION,**

J. Maya, GTE Lighting Products Business, Danvers, MA 01923, U.S.A.

12.15 44 **PROGRESS IN SAPPHIRE ENVELOPE LAMP FABRICATION AND
APPLICATIONS,**

L. Reed, N. Anderson, R. McRae and J. Richter, ILC Technology, Inc., Sunnyvale, California,
U.S.A.

DESIGN CONSIDERATIONS FOR DEVELOPING HPS LAMPS WITH
IMPROVED COLOUR RENDERING

M. Parrott, B. Prestion, R. Hall

PHYSICAL PHENOMENA ON ELECTRODES AND NEAR ELECTRODE
REGIONS IN LOW PRESSURE GAS DISCHARGE LAMPS

E. V. Okhonskaya

12.30

CLOSURE OF THE SYMPOSIUM

Prof.ir. H.G. de Winter, chairman of the organizing committee.

13.15

LUNCH AT THE BASTILLE-RESTAURANT.