

# Contents

## Volume 69 1991

FOUNDED 1925

Published Quarterly

Editorial contents copyright by  
Institute of Metal Finishing

### EDITORIAL OFFICE:

EXETER HOUSE  
48 HOLLOWAY HEAD  
BIRMINGHAM B1 1NQ  
Tel: 021-622 7387  
Fax: 021-666 6316

### ADVERTISING OFFICE:

88 MARYS MEAD  
HAZLEMERE  
BUCKS HP15 7DY.  
Tel: 0494 459339/713857  
Fax: 0494 442771

### HON. EDITOR

M. Clarke, DSc, BSc(Eng), PhD, CEng,  
CChem, FRSC, FIM, FICorr, FIMF  
(to Aug. issue 1991)  
J.P.G. Farr, BSc, PhD, FRSC, FIMF  
(from Nov. issue 1991)

### HON. EDITOR EMERITUS

Simon Wernick, OBE, PhD, MSc, FRSC,  
CChem, FIM, CEng, FIMF

### MANAGING EDITOR

Clive Larson, BSc, MIMF

### PRICE

Non Members £20.00 per copy

Typeset and printed by Williams Press,  
Maidenhead

The Institute is not responsible for the statements made  
or the opinions expressed by contributors to Transactions  
of the Institute of Metal Finishing  
ISSN No: 0020 2967



Minutes of the Annual General Meeting 1990 .....	1
The effect of pulsed reversed current on the "hole throwing power" of acid copper electrolytes containing organic additives, by T. Pearson, J.K. Dennis, J.F. Houlston and M. Dorey .....	9
Porosity of electrolytic nickel-phosphorus coatings, by J.P. Celis, J.R. Roos and Chonglun Fan .....	15
PWB Interconnect strategy using a full build electroless copper process, by K. Minten and J. Toth .....	20
The role of chromium II catalysed olation reactions in the sustained deposition of chromium and its alloys from environmentally acceptable chromium III electrolytes, by A. Watson, A.M.H. Anderson, M.R. el-Sharif and C.U. Chisholm .....	26
Electroless gold plating solution, by K. Ohtsuka, K. Okuno, N. Hattori and E. Torikai .....	33
Rotating electrode current density cells to simulate high speed electrodeposition, by A.F.S. Afshar, D.R. Gabe and B. Sewell .....	37
The formation, structure and corrosion behaviour of conversion coatings on zinc alloy electrodeposits, by N. Abibsi, N.R. Short and J.K. Dennis .....	45
Plasma thermochemical diffusion treatments for ferrous and non-ferrous alloys, by J. Lanagan .....	50
Developments of phosphate coatings on mild steel, by K.F. Ang, S. Turgoose and G.E. Thompson .....	58
Kinetics of the reaction of formaldehyde with ammonia at 23°C as followed by an ammonia selective electrode, by N.M. Martyak and B. McDuffie .....	63
Electroless copper — an alternative to formaldehyde, by J. Darken .....	66
The effect of the composition of the plating bath in the electrocrystallization of nickel, by M.Y. Abyaneh .....	70
Facts and fiction about pulse plating, by T. Pearson and J.K. Dennis .....	75
Plasma spray deposition of nylon II coatings, by Y. Bao and D.T. Gawne .....	80
Some properties of nickel-cobalt alloys electrodeposited from sulphosalicylate solutions, by J. Vitek, J. Neumann and P. Nejedly .....	86
Electrochemical impedance spectroscopy (EIS) — a powerful in-situ technique for electrode processes, by W. Paatsch .....	90
A new very low profile electrodeposited copper foil, by F. Kuwako, Y. Kodama, Y. Hirasawa, and K. Ueno .....	92
Assessing small hole plating capabilities, by D. Huffmann and M. Witowski .....	96
Testing of hard anodic oxidation coatings, by R.T. Hitchcock .....	100
The Presidential Address: Trends and developments in metal finishing, by I.R. Christie .....	117
High speed selective jet electrodeposition, by C. Bocking .....	119
Cryogenic blasting using solid carbon dioxide media for the removal of organic coatings, by L.C. Archibald .....	128
Mechanism of electrolytic composite plating: survey and trends, by J.P. Celis, J.R. Roos, C. Buelens and J. Fransaer .....	133
The relationship between phosphorus content and physical properties of electroless nickel deposits, by M. Bayes, I. Sinitskaya, K. Schell and R. House .....	140
The effect of plating variables on zinc-nickel alloy electrodeposition, by A. Abibsi, J.K. Dennis and N.R. Short .....	145
The influence of bath components on deposit and operational characteristics in hard acid gold plating solutions, by S.J. Hemsley and R.V. Green .....	149
Michael Faraday and his constant, by D.R. Gabe .....	154
<i>Tutorial Series</i>	
Electrode reactions in metal finishing, by F.C. Walsh .....	107
Electrochemical cell reactions in metal finishing, by F.C. Walsh .....	111
The overall rates of electrode reactions: Faraday's Laws of electrolysis, by F.C. Walsh .....	155
Applications of Faraday's Laws of electrolysis in metal finishing, by D. Barker and F.C. Walsh .....	158
Index .....	163