

CONTENTS AND SUBJECT INDEX

INTRODUCTION	1
ETCHANTS, PHOSPHORUS COMPOUNDS AND OTHER SURFACE TREATMENTS	3
General Etching Formulations	3
High Chromium Content	3
Hexavalent Chromium-Hydrocarbon Fraction Reaction Product	4
Chromium Complex	5
Fluorocarbon Surfactant - Two-Stage Treatment	6
Ethylenediamine Treatment After Etch	6
Ammonium Hydroxide Addition	6
Electrolytic Reduction in Oxidizing Solution	8
Phosphorus Compounds	10
Phosphate	10
Phosphorus Sesquisulfide	11
Phosphorus, Metal Salt, Amine and Alkali Metal Hydroxide	12
Cesium Chloride Treatment of Metal Phosphides	14
Elemental White Phosphorus	14
Stable White Phosphorus Solutions	15
Phosphorus-Organometallic Reaction Products	16
Metal Phosphide Alloys	18
Phosphorus Solution Containing Viscosity and Surface Tension Modifier	20
Metal Salt-Phosphine Complex	21
Metal Salt-Phosphine Complex and Free Radical Generator	22
Other Surface Treatments	23
Emulsified Solvents	23
Sulfur-Containing Solvent Solution	24
Surfactant Treatment	26
Sulfuric Acid, Silver Acetate and Nitric Acid	27
Acids and Metal Hydroxides	28
Silver Salt and Metal Halide	29
Nickel-Zero Complex in Organic Solvent	30
Arsenic Chloride	31
Alcohol Solutions of Metal Salts or Oxides and Polyethyleneimine	32
Impregnation with Copper and Nickel Salts	32
Extractable Fillers	34
Silica Fillers as Catalyst Binders	36
Reduction of Platinum Complex on Substrate	37
Carboxyl-Modified Polypropylene Adhesive Layer	39
Reduction of Metal Oxides in Elastomeric Matrix	41
Glow Discharge and Oxidizing Agents	45
Sulfonation	46
GENERAL USE ACTIVATORS AND SENSITIZERS	48
Palladium Complexes	48
Using Organic Acids	48
With Hydrogen Chloride and Water	50
With Group IV Metal and Suitable Anion	51
Other Formulations	53
Activator Hydrosols	53
Stannous Chloride Pretreatment	54
Colloidal Metal Solutions	55
Rejuvenation of Accelerating Solution	56
Water-Soluble Alcohols and Glycols as Stabilizers	58
Copper Chloride Stabilizer	59
Single Stage Activation	60
Spray Technique with Alkaline Tin	61
COPPER PLATING	62
Bath Stabilizers	62
Mercury Salts	62
Covalent Mercury Salts	63
Molybdenum, Tungsten or Rare Earth Metal	64
Selenium Compounds	65

Polyether Adducts of Acetylenic Alcohols	66
Sulfamic Acid	67
Salts of Hydroxy Sulfonic Acids	68
Ethoxylated Cyclohexylamine Complexes	71
Rhodanine	71
Cyanide Complexing Agents	72
o-Phenanthroline and Iodides	72
2,2'-Biquinoline	73
Alkylmercaptans	73
Sodium Thiosulfate and Ethyl Alcohol	74
Multicomponent Stabilizer Mixture	74
Excess Methanol and Rochelle Salt Complexer	75
Rochelle Salt Purity Affects Stability	77
Physical Property Improvers	78
Extraneous Ion Deposition at Inner Layer	78
Organic Silicon Compounds	79
Formaldehyde Addition Agents	83
Deposition Aids	85
Ionic Accelerators	85
Osmium Tetroxide	87
Gold Sulfite Sensitizer	88
Metal Cyanide Complex Accelerators	88
Automatic Control of pH of Bath	89
Cuprous Thiocyanate and Thiourea to Impart Conductivity	92
"Stardusting" Prevention	93
NICKEL, COBALT, ALUMINUM AND PRECIOUS METALS	94
Nickel and Cobalt - Pretreatments	94
Combined Etching and Sensitizing Treatment	94
Palladium-Sulfuric Acid Pickling Solution	95
Quaternary Amine Surfactant Solutions	97
Tartaric Acid Added to Sensitizer	97
Nickel and Cobalt - Bath Additives	98
Fluoroborate and Sulfamate Ions	98
Sulfonic Acid Compounds	101
Propane Sulfone	101
Alkali Metal Lignosulfonate	102
Alkali Metal Borohydrides	103
Alkali Metal Cyanoborohydride	104
Amine Boranes	105
Ammonium, Acetate and Citrate Ions	105
Ascorbic Acid as Second Reducing Agent	106
Low Temperature Plating	107
Electroless Plating at Room Temperature	108
Nickel and Cadmium Salts	109
Aluminum	110
Trihydrocarbylamine Complex	110
Aluminum Hydride Reduction on Surface	111
Gold	111
Soluble Gold Compound	111
Cycloaliphatic Amine Stabilizers	112
Water-Soluble Cyanides as Stabilizers	112
Other	113
Palladium	113
Cadmium	114
POLYOLEFINS	116
Surface Treatments	116
Ketones	116
1,3-Diphenyl-2-Propanone and Cyclooctadiene	117
Dialkylamine	118
Acid Chromate Etch and Persulfate Treatment	118
Octyl Diphenyl Phosphite	120
Aqueous Emulsions of White Phosphorus and Trichloroethylene	122
Linseed and Castor Oil Emulsions	123
Aryl Sulfonic Acid Added to Chromium Bath	125
Organic Peroxide	126
Postchlorination of Polyethylene	128
Internal Modification	129
Adhesion-Promoting Polymer and Active Filler	129
Catalyst Support as Filler	130
Talc	132

Inorganic Fillers	133
Methyl Abietate	135
Calcium Resinate	136
Surfactants	138
Oxidizable Additive	138
Blends with Ethylene-Propylene Elastomer	140
Blends with EPDM	141
Coumarone-Indene Resins	142
Related Polymers	144
Ethylene-Diolefin Polymers	144
4-Methyl Pentene-1 Polymers	145
Sulfonic Acid Modified Polyethylene	146
ABS RESINS	147
Surface Treatments	147
Organic Solvent Treatment	147
Glycol Acetates	148
Chromic-Phosphoric-Sulfuric Mixture	149
Palladium Salt in Phosphoric Acid	150
Palladium Salt in Sulfuric Acid	151
One-Step Conditioner-Sensitizer	151
Molybdic, Phosphoric and Sulfuric Acid Mixture	152
Potassium Permanganate in Orthophosphoric Acid	154
Phosphoric Acid Recovery	155
Alkali Metal Manganates	155
Surface Oxidation	156
Resin Treatment	156
Adhesive in Solvent	157
Isooctyl Stearate Additive	159
Related Polymers	159
Styrene-Acrylonitrile-Polybutadiene Graft Copolymers	159
Styrene-Acrylonitrile-Vinylpyridine Terpolymers	161
MAGNETIC COATINGS WITH POLYETHYLENE TEREPHTHALATE	163
Pretreatments	163
Cuprous Iodide and Polyvinyl Formal Binder	163
Nucleating Metal and Intermediate Bonding Layer	164
Polyester and Gelatin Coating	166
Iron Powder in Binder	167
Phenol Etching Solution	168
Phenol in Alkali	168
Alkali Metal in DMSO	170
Werner Chrome Complexes and Chloral	171
Preconditioning/Seeding	173
Iridescent Surface	174
Flame Treatment for Vacuum Metallizing	176
Bath Compositions	177
Magnetic Cobalt Bath with Malonate Ion	177
Regulating the Rate of Electroless Deposition	177
Magnetic Cobalt and Cobalt Alloy	178
Electroless Cobalt with Controlled Magnetic Properties	180
Magnetic Recording Tape with Cobalt-Phosphorus Alloy	180
Sequestering Agent for Iron in Magnetic Alloy Deposition	182
THERMOPLASTIC AND THERMOSET RESINS	183
Nylon and Polyimides	183
Multiple Action Bath	183
Aqueous Reducing Acids	184
Aqueous Iodine Treatment	185
Trihydroxymethyl Phosphine Treatment	185
Organic Fillers	186
Polyimide	187
Polyimide in Magnetic Memory Unit	188
Halogenated Polymers	189
Phenol Pre-Etch	189
Alkoxide-Activated Surface	189
Stannous Chloride and Stannic Chloride Solutions	191
"Nickel-Zero" Complex	192
Vinyl Chloride-Fumarate Ester Copolymers	194
Vinyl Chloride and Long-Chain Alkyl Ester Copolymers	195
Graft Copolymers of Vinyl Chloride and Conjugated Dienes	195
Vinyl Chloride Grafted Ethylene-Vinyl Chloride Copolymers	196

Electrical Discharge Treatment of Fluorocarbon Polymers	198
Pyrolysis of Nickel Carbonyl on Teflon	199
Codeposition of Metal and Fluorocarbon Resin Particles	201
Polystyrene	203
Monochlorobenzene Emulsion	203
o-Dichlorobenzene, Sulfur Trioxide and Trimethyl Phosphate	204
Nitric Acid Treatment	206
Blends with ABS	207
Coated Cross-Linked Polystyrene Beads	207
Polyoxymethylene Polymers	208
Surface Treatment of Homopolymers	208
Preparation for Vacuum Metallizing	209
Gas Plating	209
Other Thermoplastics	210
Polyarylene Polyethers and Polycarbonates	210
Polycarbonate	213
Polysulfone	214
Electronically Conductive Polyurethane Polymers	215
Polyurethane Elastomer	216
Ammoniated Carboxylic Acid Copolymers	217
Plastic Polyblends	218
Thermosets	219
Phenolic Resins	219
UF (Urea-Formaldehyde)	220
Control of Flex Strength of Plate	221
Chemical Pitting of Epoxy Surface	223
Epoxy and Molten Eutectic	224
Diallylphthalate	225
PRINTED CIRCUITS. ELECTRODES AND OTHER APPLICATIONS	227
Printed Circuits and Selective Plating	227
Colloidal Catalyst Solutions	227
Activation of Metal-Clad Laminated Surfaces	228
Dimethylformamide Treatment	230
Octyl Phenol Surfactant Treatment	230
Etching of Sensitized and Activated Surfaces	232
Metal Phosphide Treatment	233
Activating Agent Applied as Pattern	234
Predetermined Patterns	234
Highly Stressed Deposit	236
Poisons to Enable Selective Plating	238
Copper Concentration Held Within Narrow Limits	240
Gold Intermediate Layer	241
Oxidizable Rubber Coating on Base Material	243
Thermosetting Resin Adhesive Layer	246
Inks Containing Catalytic Metal	246
Roughening Followed by Adhesive	248
Catalytically Treated Fillers	248
Active Silica Filler	251
Organic-Metallic Fillers	253
Acrylic Polymer Masking Agent	255
Multicomponent Plastic Articles	256
Fuel Cell Electrodes	259
Polysulfone	259
Nylon or Glass	260
Cellulose Triacetate	260
Hollow Polyethylene Fibers	261
Dyes a Intermediate ti ei	262
ii Surface Bonds Cationic al	263
Other Specific Uses	264
Protective Coatings for Plating Racks	264
Copper-Polypropylene Stripline Boards for Antennas	266
Prepared Textile Dye Tubes	267
Metallizing of Microcapsules	268
Lead Coated Fluorocarbon Polymer Expulsion Membranes	269
Shielded Wires and Antistatic Textiles	270
COMPANY INDEX	272
INVENTOR INDEX	274
U.S. PATENT NUMBER INDEX	277