Advances in Printing and Packaging Technologies

Selected, peer reviewed papers from the 2nd China Academic Conference on Printing and Packaging (CACPP 2012), October 19-20, 2012, Beijing, China

Edited by
Ouyang Yun, Xu Min, Yang Li and Liu Xunting
# Table of Contents

**Preface**

**Sponsors and Committees**

## I. Color Science and Technology

<table>
<thead>
<tr>
<th>Study on Color Spectrum Prediction Accuracy of CYNSN Model</th>
<th>Z.J. Si, Y. Hu, J. Wang and Y. Li</th>
<th>3</th>
</tr>
</thead>
<tbody>
<tr>
<td>Study on the Color Representing Accuracy of Spectrum with Different Wavelength Range and Interval</td>
<td>J. Niu, X.D. Zhang and Q. Wang</td>
<td>13</td>
</tr>
<tr>
<td>Analysis on Color-Distinguishing Threshold of Printed Samples and Chromatic Characteristics of Human Eyes</td>
<td>W.Y. Li and H.L. Dong</td>
<td>18</td>
</tr>
<tr>
<td>A Graphic/Picture Classification Method Based on Spatial Characteristics of Colors</td>
<td>S.Y. Cai, X. Nie and S.Q. Guo</td>
<td>31</td>
</tr>
<tr>
<td>Three-Dimensional Color Gamut Visualization of Digital Output Device Based on ICC Profile</td>
<td>Y.H. Luo and M.H. Lin</td>
<td>36</td>
</tr>
<tr>
<td>Effective Dot Area’s Calculating Based on YNSN Model</td>
<td>C.F. Zhao, Q. Han, C.C. Chi and Q.J. Meng</td>
<td>40</td>
</tr>
<tr>
<td>The Research on Color Characteristics of Four Mainstream Monitor</td>
<td>Y. Liu, M. Zhou and Y.F. Xu</td>
<td>44</td>
</tr>
<tr>
<td>Research on Reconstruction of Spectral Reflectance Based on Principal Component Analysis</td>
<td>Y. Zhang and S.S. Zhou</td>
<td>53</td>
</tr>
<tr>
<td>Research on Robustness of Color Device Characteristic Methods Based on Artificial Intelligence</td>
<td>C. Zhi, Z.J. Li and Y. Shi</td>
<td>65</td>
</tr>
</tbody>
</table>
The Theory of the Density-Based Gravure Spot-Color Matching
R.B. Luo, N. Jiang, S.S. Zhou and Y. Zhang ................................................................. 69

Spot Color Matching Method Based on Preserved High Saturation for Inkjet Digital Proofing
H. Su, Y.H. Yi, J.H. Liu and M.J. Miao ........................................................................... 74

The Experimental Research on Tiled Multiple Projectors Displaying Based on ICC Mechanism
Z. Liu, M. Zhu and J. Yu ..................................................................................................... 80

Study on Correlation of Color Components Image in Different Color Spaces

Measuring and Adjusting the Printed Color Using the Complex Frequency Spectrum Color Characteristic Values
Y.C. Pang, D.Y. Pang and Z.J. Li .................................................................................... 92

A Discussion on Printing Color Difference Tolerance by CIEDE2000 Color Difference Formula
H.X. Liu, B. Wu, Y. Liu, M. Huang and Y.F. Xu ............................................................. 96

Study on the Applied Performance of Color Inks
Y.K. Ding, Y.F. Xu, L.H. Li and W.B. Li ......................................................................... 100

Color Application Techniques on Map Designing in Prepress
S.D. Liu, S.J. Chen, B. Sun and H. Liu ........................................................................... 105

Framework Design of Multispectral Color Management
H.W. Wang, J. Li and G.X. Chen ..................................................................................... 109

Research on Chromaticity Characterization Methods of the Ink Trapping
J.H. Liu and S.H. Gao ...................................................................................................... 113

A Print Performance Study of the Environmental Friendly Wide Gamut Process Inks
L.Y. Ma and T.Y. Hao ..................................................................................................... 119

Influence Analysis of Color Input Target to the Scanner Color Characteristic
H.J. Xin and Y. Liu ........................................................................................................... 123

II. Image Processing Technology

Analysis of Area Field Quality Based on ISO 19751 and ISO 13660
Y.M. Zhou, Z.M. Jiang and Z.Y. Jin .............................................................................. 129

X.Y. Xu, L.J. Wang and Q. Chen ................................................................................... 134

Researches on the Information Hiding Technology Used in Paper-Based Document Images
W. Guo, Y.X. Liu, Z. Zong and W.F. Qi ...................................................................... 138

Research of Digital Watermarking Algorithm in Wavelet Domain Based on Arnold Transformation and SVD
T. Sheng and X.P. Zhao ................................................................................................. 143
Research of Image Location for Print Whole Image On-Line Detection System  
J.Q. Hao, W.Y. Tang, R.X. Jiang and D.Y. Yi .................................................. 147

Line Output Quality Assessment of Digital Printers  
Y.H. Song, P.F. Wang and Y.F. Xu ................................................................. 152

Applied Research of Assessment Methods on Video Quality  
C. Gu and Z.J. Si ...................................................................................... 157

Comparative Research in Image Mosaic Based on the Similarity Measure of  
Print Detecting  
D.Y. Yi, W.Y. Tang and J.Q. Hao ................................................................. 163

An Improved Method of USM Processing on Color Image  
J.H. Liang and L. Gong .............................................................................. 168

Research on Correction Algorithm for Print-Scan Resistant Digital Watermark  
Algorithms Based on DWT  
Z.J. Zhang, Z. Liu and H. Yu ........................................................................ 172

Study on the Assessment Method of Print Mottle Using Discrete Wavelet Analysis  
G.D. Liu, M.Y. Zhang and Q.P. Liang .......................................................... 177

Halftone Image Quality Assessment Based on Digital Watermark  
Y.F. Zhong, L.J. Fu, J. Zou and R.H. Deng .................................................... 181

Effect of Input Precision on Line Micro Quality Measurement  
X.M. Cui, G.X. Chen and H.M. Wang ............................................................ 186

The Comprehensive Processing Methods on Reproducing of the Image of Relic on  
Subtle Levels  
X.Q. Chen .............................................................................................. 190

Exploration for the Gratings Used for Auto-Stereoscopic  
Three-Dimensional Printing  
R.R. Qin, W.C. Xu, S.Y. Luo and X.L. Zhang ................................................ 195

III. Digital Technology

Advertising Efficacy Research on E-Paper Application for MRT Station  
Bulletin Board  
Y.C. Hsieh, Y.Y. Lee and S.Y. Cheng ........................................................... 203

The Construction of a Knowledge Discovery Model on In-Depth Analysis and  
Reporting by Exploring Taiwan’s Examination Database  
M.J. Hsu, C.P. Ho and F.N. Han .................................................................. 207

A Consumers’ Preference Study on E-Book Reading  
T.Y. Hao, F.N. Han and C.P. Ho .................................................................. 213

Experimental Study of Digital Printing Methods for Producing  
Personalized Packaging  
Y.M. Zhou, X.Y. Rong and Z.M. Jiang ......................................................... 217

A Study of E-Book Industry’s Cooperation in Taiwan  
T.Y. Hao, L.Y. Ma and H.J. Lee .................................................................. 223

A Study of E-Book Readability  
M.T. Tai, C.K. Lin, Z.R. Ke and P.Y. Chen ...................................................... 227
A Study of Reading Fatigue
M.T. Tai, Y.H. Yang, G.N. Zu and Y.J. Hsieh ................................................................. 231

Realization of Digital Printing Workflow for Domestic Small and Medium-Sized Printing Enterprises
B.Z. Qiu, X.L. Liu, W. Wei, H.N. Zhou and X.Y. Zuo ......................................................... 235

IV. Process Research and Standardization

The Research on EHD Micro-Jet Printing Technology under Pulse Voltage
J.J. Tan, Z.N. Tang and Q. Wang ......................................................................................... 243

A Preliminary Study on Artistic Transcending of Printing Dots
X.Z. He, Y. Zhang and L.P. Xie ....................................................................................... 247

A Study of Color Variance between Vacuum Plate of Aluminum and Aluminum Foil Using UV Offset Printing
C.L. Chen, M.C. Lo, M.C. Wei and S.W. Wang ................................................................. 253

Model of Ink Quantity Control Based on Colorimetry System
L. Jiang, S.S. Zhou and Y. Cui ......................................................................................... 258

Research and Application on Screen Soft Proofing Technology in Printing Quality Control
Z.J. Si, J. Wang and C. Gu .................................................................................................. 263

Influence of Inkjet Paper Coating Structure on Paper Properties and Print Performance
Y.C. Zhu, Y.Z. Chen and Z.J. Zhang ................................................................................ 269

The Effect of UV Inkjet Ink’s Performance on the Line Printing Quality
W. Zhang, X.F. Wei, B.Q. Huang and L. Zhao .................................................................. 273

Quality Control Parameters Study on Flexography Cyrel Digital Imager System
Y. Wang, Y.Y. Zhou and W. Zhang ................................................................................... 278

Research on the Influencing Factors to Printing Quality of Edible Ink-Jet Printing Ink
J.M. Sun, X.F. Wei and B.Q. Huang ................................................................................ 282

A Study of Print Quality of UV Ink-Jet Printing on Glass
S. Liao, M.T. Tai, S.C. Lin and C.K. Lin .......................................................................... 287

Study on the Model of Chromaticity Closed-Loop Control for Print Online Detection

Study on the Effect of Paper Properties on the Dot Reproduction Attributes Based on the Grey Relational Analysis
F.Q. Chu and C.Y. Li ........................................................................................................ 297

Application of Grey Relational Analysis and SVM for Solid Density Control in Offset Color Printing
F.B. Chen, Y.Z. Chen and Z.J. Zhang ............................................................................... 302

A New Vector Dot Generating Algorithm for Digital AM Screening
Y. Yang and X.P. Zhao ...................................................................................................... 307
The Processes of Practicing Green-Mark of Printing Companies in Taiwan
F.N. Han and S.Y. Tzeng .......................................................... 311

A Study of Special Printing Used in the Theories of Graphic Design
P.L. Liau, J.L. Luo and G.N. Zu .................................................. 315

Offset Printing Quality Characteristics of Rich Mineral Paper

Study on the Printability of UV-Curable Inkjet Ink on Different Printed Materials
X. Yang, X.F. Wei, B.Q. Huang, W. Zhang and L. Zhao .................. 324

Research on the Influence of Ink Surface Tension to the Formation of Ink Droplet
C.J. Jia, G.X. Chen, X.Z. Li and L. Zhao ................................. 329

Research on Parameters and Printing Reproduction Characteristics of Concentric Screening
Q. Wang, X.F. Zhou and Q. Yi .................................................. 334

The Study on Color Print Quality Attributes of In-Mold Roller Using Digital Inkjet Printing

Color Gamut of UV Wide-Format Inkjet Printing on Special Substrates
Y.C. Hsieh, H.T. Lee and S.Y. Cheng ......................................... 345

Theoretical Research of Color Reproduction on Concentric Dot
Q. Wang, X.F. Zhou and X.H. Liu ........................................... 349

Research on Computing Model of the Cell Volume for Electronic Engraved Gravure
P.J. Deng, G.M. Zhang, W. Fang and J.H. Guo ............................ 355

V. Mechanical Engineering and Numerical Control Technology

A Fault Diagnosis Method for the Roller-Marks in Offset Printing Machine Based on Texture Recognition
Z.F. Xu, H.Y. Zhang and L.H. Ren .......................................... 361

Decoupling Control for Unwinding Tension Control Systems
M. Bian and M. Yang ............................................................. 367

Research on the Suction-Tape Feeding Technology Maturity of Printing Press Based on TMMS
X. Zhang and Y. Li ............................................................... 372

Vibration Analysis on Convey Paper Belt of Infeed Unit
W.C. Bao, H. Chen and Y.M. Liang ........................................ 377

VI. Materials and Detection Technology

The Influence of Process Factors on Liquefaction Residue Rate of Wood Packaging Waste
C. Yuan and X.J. Ma ............................................................. 385
The Finite Element Study of the Compressive Strength of Typical Waveform Corrugated Box
W. Yuan, W.C. Xu, G.M. Zhang and L.H. Xie ................................................................. 390

Detecting the Eight Kinds of Organic Solvent Residue in Paper by HS-GC/MS
Y.H. Xing, J. Wu, Z.Y. Wang and K. Ding ................................................................. 395

Research on the Ink Absorption Test Method of High Reflectivity Paper
Q.W. Wang, S.Y. Fu and G. Chen ................................................................................. 401

Synthesis and Characterization of Foamed Cassava Starch Material
Y. Liu, S.S. Li, X.Y. Yang and C.X. Huang ................................................................. 405

Study on the Printability of Coated Paper on High-Fidelity Digital Printing
Q.F. Chen, G.X. Chen, B.L. Tang and J.L. Tai ............................................................ 410

The Application of Gray Associated with Neighborhood Characteristics in the Defect Denoising
A.J. Wei, Q. Li and W. Tang ...................................................................................... 414

Study on the Technical Conditions of Old Newspaper(ONP)/Recycled-Polypropylene(rPP) Composites
X.L. Zhang and X.F. Bo ......................................................................................... 418

Use of Microcapsules of Oregano Essential Oil to Extend the Shelf Life of Strawberries
G.F. Liu, J.Q. Wang and Y.Z. Zhao ........................................................................... 422

Research of the Factor that Influence the Glossiness of Water-Based Tipping Paper Gravure Varnish
M.J. Yu, B.Q. Huang and X.F. Wei ........................................................................... 426

Preparation and Properties of Anionic Polymer Emulsion in the Presence of a Reactive Surfactant
H.S. Lu, Z.X. Li, Y.G. Feng and J.L. Pu ...................................................................... 430

Application of Water-Based Magnetorheological Fluid in the Production of Stereoscopic Printing Grating
Z.W. Zhu, G.X. Chen, Q.F. Chen and B.L. Tang .......................................................... 435

Study on the Double-Layer Structure Thermal Imaging System
J. Cao, W.M. Zhang and J.L. Pu .............................................................................. 440

The Research of Coating Process for Paper-Based Printing Plate
N. Wei and X.X. Hao ................................................................................................ 444

Synthesis of a Novel Low Dielectric Constant Fluorine Containing Epoxy
J.Y. Lv, Y. Meng, L.F. He, T. Qiu, X.Y. Li and H.Q. Wang ........................................ 448

Study on a Characterization Method of Curing Rate of UV Curing System Based on Rheokinetics
B.Q. Huang, K.Y. Luo, X.F. Wei, L.Y. Gu and M.Q. Yu ............................................. 454

Synthesis and Property of Water-Soluble Hyperbranched Polyacrylate Emulsion
Y. Yu, X.L. Xin, Y.N. Wei, H.Q. Liu and S.X. Yang .................................................... 460

Research on the Surface Tension of Water-Based Ink-Jet Ink
B.Q. Huang, L. Jia, J.M. Sun and X.F. Wei ............................................................... 464

Investigation on Post Treatment of Nano-Size Silver Conductive Film
W. Zhao, L.H. Li, X.W. Hu and L.X. Mo .................................................................. 470

Study on Sterile Anti-Shedding UV Ink Used on PE Bottle Cap
Z.C. Qu, G.X. Chen and B.L. Tang ........................................................................... 475
<table>
<thead>
<tr>
<th>Title</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>Study on Thickening after Preparation Phenomenon of Alcohol-Based Gravure Ink</td>
<td>480</td>
</tr>
<tr>
<td>Y.J. Xu, X.F. Wei and B.Q. Huang</td>
<td></td>
</tr>
<tr>
<td>The Influence of Pigmental Surface Sizing on the Physical and Laser Printing Properties of Paper</td>
<td>486</td>
</tr>
<tr>
<td>Z.J. Zhang, Y.T. Han and Y.Z. Chen</td>
<td></td>
</tr>
<tr>
<td>Study on Preparation and Property of Acrylic Resins Used for Water-Based Ink</td>
<td>491</td>
</tr>
<tr>
<td>W.T. Huang, G.X. Chen, B.L. Tang and M.G. Yu</td>
<td></td>
</tr>
<tr>
<td>Study of Edible Ink</td>
<td>497</td>
</tr>
<tr>
<td>Y.H. Su and X.P. Zhao</td>
<td></td>
</tr>
<tr>
<td>A Nano-Silver Inkjet Conductive Ink with Excellent Adhesion</td>
<td>501</td>
</tr>
<tr>
<td>J. Ran, L.X. Mo, W.B. Li, W.W. Li, X.M. Fan, J.L. Fu and L.H. Li</td>
<td></td>
</tr>
<tr>
<td>Effect of Solvent on the Property of the Infrared Absorbing Inkjet Ink</td>
<td>505</td>
</tr>
<tr>
<td>L. Yang, X.F. Wei, B.Q. Huang, W. Zhang and Y. Yue</td>
<td></td>
</tr>
<tr>
<td>Effects of Fillers on the Transfer Properties of UV Waterless Offset Ink</td>
<td>510</td>
</tr>
<tr>
<td>L.Y. Gu, K.Y. Luo, B.Q. Huang and Y.D. Song</td>
<td></td>
</tr>
<tr>
<td>Preparation of Cu NPs Suspension for Conductive Ink</td>
<td>514</td>
</tr>
<tr>
<td>W.B. Li, L.X. Mo, W.W. Li, X.M. Fan, J. Ran, J.L. Fu, Y.F. Xu and L.H. Li</td>
<td></td>
</tr>
<tr>
<td>Investigation on Factors Influencing Fluorescence Intensity of Red Fluorescent Inkjet Ink</td>
<td>518</td>
</tr>
<tr>
<td>S.H. Gao, X.F. Wei, B.Q. Huang, W. Zhang and X.W. Hu</td>
<td></td>
</tr>
<tr>
<td>Preparation of Water-Based Nano-Silver Gravure Conductive Ink Used for Printed Electronics</td>
<td>523</td>
</tr>
<tr>
<td>W.W. Li, L.X. Mo, J.L. Fu, W.B. Li, J. Ran, X.M. Fan, Y.L. Li and L.H. Li</td>
<td></td>
</tr>
<tr>
<td>Study on the Dispersity of Black Water-Based Covering Ink</td>
<td>527</td>
</tr>
<tr>
<td>D.D. Wang, B.Q. Huang, X.F. Wei, J.H. Liu and S. Liu</td>
<td></td>
</tr>
<tr>
<td>Modification of $\gamma$-Al$_2$O$_3$ as Ink-Jet Printing Paper Coating Pigment by Coupling Agents</td>
<td>532</td>
</tr>
<tr>
<td>L.H. Guo, Q. Zhu, Z.J. Wang and X.H. Guo</td>
<td></td>
</tr>
<tr>
<td>Research on Formula of Dye-Based UV-Curable Ink for Inkjet</td>
<td>537</td>
</tr>
<tr>
<td>Y. Zhi</td>
<td></td>
</tr>
<tr>
<td>The Study of the Affect Factors on Color Fastness to Crocking of Inkjet Ink</td>
<td>543</td>
</tr>
<tr>
<td>J.F. Yan, B.Q. Huang and X.F. Wei</td>
<td></td>
</tr>
<tr>
<td>Influence of Resins on Properties of Copper Screen Printing Conductive Ink</td>
<td>547</td>
</tr>
<tr>
<td>X.M. Fan, L.X. Mo, W.B. Li, W.W. Li, J. Ran, J.L. Fu and L.H. Li</td>
<td></td>
</tr>
<tr>
<td>Study on an Aliphatic Polyurethane Laminating Adhesive Based on Castor Oil</td>
<td>551</td>
</tr>
<tr>
<td>S.L. Chen, G.X. Chen and J.W. Liu</td>
<td></td>
</tr>
<tr>
<td>Preparation of Porous Cellulose Packaging Films in Alcohol Coagulation</td>
<td>557</td>
</tr>
<tr>
<td>S.S. Gao, J.Q. Wang, X.F. Ma and L. Zhao</td>
<td></td>
</tr>
<tr>
<td>A Comparison of Soxhlet Extraction and Ultrasonic-Assisted Extraction for Analysis of Photoinitiators in Printed Cartonboard Food-Packaging Materials</td>
<td>561</td>
</tr>
<tr>
<td>C. Ding, F. Wang, M.X. Pang, X.X. Yi, F. Tan, Y. Xu and J.H. Qi</td>
<td></td>
</tr>
<tr>
<td>Research on Maleic Anhydride Improving the Interfacial Compatibility of PLLA and OMMT by Grafting Method</td>
<td>567</td>
</tr>
</tbody>
</table>
Thermal Decomposition Kinetics of PLLA/Talc/TBC Composites

A Case Study of Carbon Footprint on Liquor Packaging
Y.B. Fu, W.C. Xu, Y.R. Jiang and G. Zhou ........................................................................577

Preparation and Properties Research of Anti-Fogging Polypropylene Packaging Films
X.J. Gao, L.Q. Huang and X. Li ...........................................................................................581

Gas High Permeability and Ethylene Adsorption Active Packaging for Strawberry Preservation
Y.R. Jiang, Y.B. Fu, D.L. Li and W.C. Xu ...........................................................................586

The Antibacterial and Preservation Performance of Cling Wrap Coated with Nano-Silver Film
G.M. Zhang, Q. Chen, W.C. Xu, F.J. Yang, L.Q. Qiu and W. Yuan ........................................591

Keyword Index .......................................................................................................................597

Author Index ..........................................................................................................................603