

# **12th TAPPI Advanced Coating Fundamentals Symposium 2012**

Atlanta, Georgia, USA  
10-12 September 2012

ISBN: 978-1-5108-1496-7

**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© (2012) by the TAPPI Press  
All rights reserved.

Printed by Curran Associates, Inc. (2015)  
For permission requests, please contact the TAPPI Press



at the address below.

TAPPI Press  
15 Technology Parkway South  
Peachtree Corners, Georgia 30092

Phone: (800) 332-8686  
Fax: (770) 446-6947

[memberconnection@tappi.org](mailto:memberconnection@tappi.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: 845-758-2634  
Email: [curran@proceedings.com](mailto:curran@proceedings.com)  
Web: [www.proceedings.com](http://www.proceedings.com)

# 12<sup>th</sup> TAPPI Advanced Coating Fundamentals Symposium Proceedings

September 10-12, 2012, Atlanta, Georgia

## TABLE OF CONTENTS

### Session 1 – Fluid and Solid Mechanics of Coating, Printing

- 1.1 - Coating Models for an Analysis of Cracking Behavior between Folded Paper and Creased Board.....1**  
*Christophe Barbier, Karlstad Universit;, Peter Rättö, Joanna Hornatowska, Innventia*
- 1.2 - Modeling of Lateral Thickness Variation in a Liquid Curtain with Edge Guide.....13**  
*Yingfeng Shen, Annaleena Kokko, VTT Technical Research Centre of Finland*
- 1.3 – Prediction of Forces on Paper During Half Tone Dot Printing.....25**  
*Harrison Gates, Douglas W. Bousfield, University of Maine*

### Session 2 – Novel Paper Coatings

- 2.1 - Conductive Surfaces on Coated Papers by Flexographical Printing.....43**  
*Dimitar Valtakari, Roger Bollström, Martti Toivakka, Abo Akademi University; Mikko Tuominen, Hannu Teisala, Jurkka Kuusipalo, Mikko Aromaa, Jyrki M. Mäkelä, Tampere University of Technology; Jun Uozumi, Jarkko J. Saarinen, Abo Akademi University, Hokkai-Gakuen University*
- 2.2 - The Effects of Coating Structure and Water-Holding Capacity on the Oxygen-Scavenging Capacity of Enzymes Embedded in the Coating Layer.....53**  
*Kristin Johansson, Caisa Johansson, Lars Järnström, Karlstad University; H. Christophliemk, Tampere University of Technology; Leif J. Jönsson, Umeå University*
- 2.3 – Development of Biocompatible Flexible Films with Very High Barriers Properties against Water, Grease and Gases Using Smart Reacto-Chromatogenic Nanoparticles.....67**  
*Camélia Stinga, Daniel Samain, BT3 Technologies; David Guérin, Domaine Universitaire*

### Session 3 – Coating Structure Analysis

- 3.1 – Contact Angle and Related Measurements-Insights into Paper Surface Characterization.....80**  
*Arne Krolle, BYK Chemie; Wolfgang Bauer, Graz University of Technology*

**3.2 – Comparative Study of Coating Structural Characteristics for Spray and MSP Coated Papers by Spray and MSP Coating Methods.....95**  
*Ailee Ho, Church and Trought, Inc.; Ning Yan, University of Toronto*

**3.3 – Characterization of Thin Pigment Coating Layers Produced by Foam Coating.....109**  
*Eija Kenttä, Karita Kinnunen, Tuomo Hjelt, VTT Technical Research Centre of Finland*

#### **Session 4 – Drying and Heat Transfer Fundamentals**

**4.1 – Liquid Retention in Porous Coatings: Effect of Pore Geometry and Material Interactions on Drying Efficiency.....119**  
*Philip M. Gerstner, Aalto University, University of Plymouth; Patrick A.C. Gane, Aalto University, Omya Development, AG; Hai Zhang, Petri Ronkainen, Aalto University*

**4.2 – Elucidating the Mechanisms of Liquid and Vapour Transport During the Drying of Porous Coatings.....137**  
*Joel Songok, Martti Toivakka, Abo Akademi University; Douglas W. Bousfield, University of Maine; Cathy J. Ridgway, Aalto University; Patrick A. C. Gane, Aalto University, Omya Development, AG*

**4.3 – Effects of Coating Formulation on Coating Thermal Properties and Coated Paper Print Quality in Xerography.....148**  
*Chong Liang, Mascoma Canada Inc.; Ning Yan, University of Toronto; David Vidal, Xuejun Zou, FPInnovations*

#### **Session 5 – Nanotechnology in Paper Coating**

**5.1 – Size-Selective Absorption into Pigmented Coating Structures: Suspension Starch Polymer vs. Nanofibrillar Cellulose.....163**  
*Cathy J. Ridgway, Omya Development AG; Patrick A.C. Gane, Omya Development AG, Aalto University*

**5.2 – The Effects of Nano-fibrillated Cellulose as a Coating Agent for Screen Printing.....186**  
*Hitomi Hamada, Kenji Tahara, Asuka Uchida, Research Institute, National Printing Bureau of Japan*

**5.3 – Laser Marking of Double Coated Board.....196**  
*Anthony Hiorns, Janet S. Preston, Imerys Minerals Ltd.; Jon Morgan, Lee Metters, Domino UK*

#### **Session 6 – Binder Technology**

**6.1 – Binder Depletion during the Coating Process and its Influence on Coating Failure – a Detailed Analysis of the IGT Dry Pick Test.....218**  
*Janet S. Preston, John C. Husband, S. Booth, Imerys Minerals Ltd.*

**6.2 – ATR-IR Spectroscopy for Dynamically Measuring the Effect of Drying on Binder Migration.....235**  
*Ritwik Chattopadhyay, Douglas W. Bousfield, Carl. P. Tripp, University of Maine*

**6.3 – Coating Microstructures: Binder Distributions.....246**  
*Christina Dahlström, Tetsu Uesaka, Mid Sweden University*