Editorial



GREGG A. REED
TAPPI Journal
Editorial Board

Fundamental understanding enables new coating opportunities

TAPPI's Coating, Printing, and Surface Enhancement (CPSE) Division pursues open exchange of technical information related to materials, equipment, and processes for the manufacture, quality control, and use of coated papers, paperboard, and other substrates. Much of this technical information is presented at sponsored conferences, including TAPPICon and the Advanced Coating Symposium. Based on feedback from these events, *TAPPI Journal* peer reviews the research from these events that adds significant value to the scientific community. In last year's November issue, we presented five peer-reviewed manuscripts based on presentations given at TAPPICon 2024.

In the January special Coating Fundamentals issue, the CPSE members of the *TAPPI Journal* Editorial Board, which include myself, Gregory Welsch, and Steve Ottone, are pleased to highlight four additional peer-reviewed works that were presented at either TAPPICon or the Advanced Coating Symposium.

Coating fundamentals topics

Here's a brief description of what the reader will learn by reviewing the research in this special issue.

1. "*Optimizing water and water vapor barrier properties of water-based barrier coatings*" — Benjamin Benz, Dustin Burton, Don Ventresca, and Greg Welsch of Trinseo in Rheinmuenster, Germany; Midland, MI, USA; and Calaboogie, ON, Canada (p. 7).

The first paper from Trinseo focused on improving water-based barrier coating (WBBC) formulations using wax additives. Their results showed that small amounts of bio-wax in combination with an appropriate latex could significantly improve barrier properties, especially water and moisture vapor resistance. In addition, choosing the appropriate latex and bio-wax additive resulted in negligible effects on blocking tendency, coldset glue strength, and heat seal strength.

2. "*Comparison of the application of polysaccharide-based barrier coatings on paper using film press and spray coating*" — Anna Mayrhofer, Daniel Mandlez, and Wolfgang Bauer of Graz University of Technology, Graz, Austria (p. 25).

The second paper from Graz University explored the potential of spray application of biopolymers onto paper substrates to improve barrier properties relevant for food packaging applications. This study compared the application of low solids, high viscous aqueous solutions of alginate and chitosan using a laboratory film press coater and a purpose-built spray coating unit. Due to the low solids content of the biopolymer solutions, film press coating required a double-layer application for coat weights exceeding 4 g/m^2, making it less viable for industrial application. In contrast, spray coating resulted in higher application weights in a single step. The authors offered conclusions about the relative film and barrier properties of each biopolymer using each application method.

3. *"Influence of pre-coating layers on the performance of water-based barrier coatings"* — Kritee Pokharel, Douglas W. Bousfield, and Jinwu Wang of the University of Maine, Orono, ME, USA (p. 36).

In the third paper, researchers from the University of Maine compared the performance of a commercially available water-based barrier coating (WBBC) with and without the application of a pre-coating layer. This pre-coating layer was either based on cellulose

nanofibrils (CNF) refined to various levels or based on pigmented coatings that contained various types and levels of pigments and latex. While use of a pre-coating layer significantly improved barrier performance, the effect of folding on barrier performance varied based on the pre-coating type. For example, MVTR performance reduced after folding, but it did not cause a significant reduction in grease resistance when a CNF pre-coating layer was present. Additional conclusions can be found in this study.

4. **"Water-based adhesive penetration into paperboard and coated paperboard,"** Mubarak Khlewee, William DeSisto, and Douglas W. Bousfield of the University of Maine, Orono, ME, USA (p. 48).

The final paper, also from the University of Maine, investigated the penetration of water-based adhesives into paperboard. Limited research has been published to help us understand the influences of coated paperboard properties on forming strong adhesive bonds during converting operations. The researchers characterized the penetration of a waterborne adhesive into both uncoated and coated paperboard, where the coating layer was varied with two latex levels. Notable conclusions were made regarding the applicability of Darcy's law to explain penetration depth. Adhesive penetration was similar for both uncoated paperboard and paperboard coated with a pigmented coating having 10 pph latex content. On the other hand, for a pigmented coating with 40 pph latex content, the penetration was on the order of the coating layer thickness. The authors offered additional conclusions regarding peel force.

We hope that after reviewing these articles you will be motivated to develop new coating applications and improvements that result in growth for our sustainable future. **TJ**

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