Can coatings go thermoplastic

New polyolefin dispersions from Dow Chemical are ideal for the formulation of BPA-free can coatings

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With Canvera polyolefin dispersions from Dow Coating Materials, it is now possible to apply thin coatings of thermoplastic olefins to the interiors of steel and aluminium food and beverage cans.

Coatings are needed to protect the container from corrosion caused by the contents and also to protect the contents from contact with the metal, ensuring preservation, flavour quality and consumer safety. Conventionally epoxy coatings are used but the technology requires the use of bisphenol A (BPA), which is of concern for some consumers and brand owners.

High molecular weight, semi-crystalline, thermoplastic polyolefins have been used for decades in flexible and rigid plastic food packaging. The high viscosities of melted polyolefins, however, are not compatible with existing equipment used to apply coatings to metal can interiors. Dow Coating Materials has overcome this issue by developing aqueous dispersions of polyolefins with properties suitable for application to metal cans using existing coating equipment.

The dispersions are formed using Dow Chemical’s proprietary Blownwave mechanical dispersion process, which enables the dispersion of polyethylene (PE) and polypropylene (PP), very hydrophobic polymers, into stable emulsions in water. The small polymer particles remain suspended in water until applied to a metal container’s surface, at which point a bake step removes the water and melts the particles into a defect-free continuous film coating the inside of the can.

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JONATHAN MASON
Associate research director, Dow Coating Materials

The dispersions for use in the formulation of interior can coatings consist of carefully selected mixes of functionalised and non-functionalised PE and PP polymers that afford the properties required for effective application of the coatings to cans and performance once they are applied, according to Jonathan Mason, associate research director for Dow Coating Materials.

“The coatings need to have the right viscosity for application using existing coating equipment plus adhere strongly to metal and provide protection against the very harsh environments found inside food cans,” he observes.

The mix of polymers was identified using propriety high-throughput work processes, and pilot facilities designed to mimic can manufacturing equipment were used to optimise the polymer dispersions, coating formulations and application conditions to meet stringent industry performance requirements.

LONG-TERM SOLUTION

The polyolefin can coatings have the same safety and flavour profiles as polyolefin materials that are widely used in other food packaging applications, which is a big advantage over the existing epoxy technology. Canvera can coatings also do not contain any other materials of concern commonly found in epoxy coatings, such as styrene, epoxides and phenolic crosslinkers, so they offer everyone in the value chain from coating manufacturers to consumers, including retailers, brand owners, governments, NGOs and can manufacturers, a long-term solution, according to Mason.

The complex value chain, in fact, posed one of the greatest challenges to bringing this innovative technology to the market. “The members of the chain are interdependent and interrelated, yet each has different needs, and all had to be included in the testing and evaluation of the coating,” Mason explains.

“The key to the success of the project, consequently, was collaborating with everyone in the entire value chain,” he notes. Other challenges have included the long history of epoxy coating use for food and beverage cans, which is evidenced by the fact that some of the testing protocols are epoxy-specific, and the lengthy approval process, according to Mason.

Canvera polyolefin dispersions were launched in the third quarter of 2015, and the milestone first commercial sale was made in December of that year. Mason notes that there are over 300bn cans of food and beverages consumed each year worldwide. “Our polyolefin technology is not the only one under development as an alternative to BPA-containing epoxy coatings, but our goal is to be among those selected as the long-term solution for the industry,” he states.

Of course, Dow is also looking at other possible applications for the polyolefin dispersions. “The technology allows for the creation of polyolefin films in a way that was not previously possible, which opens up new applications. We envisage our dispersions being used where polyolefins are already used but where it might be better to apply films in a liquid form and in new applications where polyolefins would provide advantageous properties but were never considered before because they weren’t available in liquid form,” says Mason.

Dow’s Canvera polyolefin coating can be applied on existing can coating lines

For more details on Dow Canvera, go to: www.coatings.dow.com/en/products/canvera