

Non-Linear Stimuli-Responsive Block Copolymers as Dispersants and Rheological Modifiers in Architectural Coatings

The Invention:

The present invention, developed by a professor of materials science and biomedical engineering at the University of Wisconsin-Eau Claire, is a series of non-linear stimuli-responsive block copolymers optimized for use in architectural coating applications. These stimuli-responsive polymers undergo a dramatic switch in properties in response to a small change in an external stimulus, such as pH and temperature. These non-linear copolymers have unique properties compared to the linear block copolymers described in T200004. Each morphology provides different properties based on the number of branches, therefore the best match in desired properties can be selected based on specific polymer structure. Initial data shows that these polymer additives can decrease settling rate, control viscosity, and control interfacial activity, all switchable properties that are important for long-term shelf stability and stability once applied.

Architectural coatings use titanium dioxide (TiO₂) to provide opacity and base pigment to coatings like paint, primers, and stains. These polymers have demonstrated the ability to interface with pigment particles, such as TiO₂, resulting in improved dispersion of the pigment. Testing shows reduced TiO₂ concentration while maintaining zero shear viscosity and shear thinning properties, which prolongs shelf-life and prevents drips in the coatings. These properties are tunable and may be altered to tailor the product for a desired use or environment, or to readjust the properties of an aged existing product. New methods of synthesis to allow for the scaled-up production of these polymer additives are complete and new purification methods are in progress. Further development will also focus on maintaining additional properties like coverage and opacity and testing additional polymer compositions and particle surface coatings.

Applications and Benefits:

- Improve dispersion of TiO₂ in architectural coatings, therefore decreasing TiO₂ concentration
 - decrease cost to manufacture
 - decrease environmental impact
- Improve the viscosity profile of architectural coatings
- Decreased settling during long-term storage
- Decreased dripping after application
- Customizable property profile based on unique polymer structures

Intellectual Property:

A patent application is pending for this technology. For more information, please contact our licensing team at licensing@wisys.org.

Development and Commercialization Needs:

WiSys is currently seeking strategic partners in the coatings industry that are interested in co-development opportunities that would ultimately provide a route to market for commercialization of these novel copolymers.