



Non-Confidential Description
Anti-Microbial Coatings Containing Chemically Bound Biocide for Biomedical Application

Technology Case: RFT-282

Invention Summary

Scientists at NDSU have recently invented a novel antimicrobial coating that demonstrates activity towards microorganisms that are associated with infection of implanted medical devices. This innovation therefore, has applications as antimicrobial coatings on medical devices such as prosthetic heart valves, urinary catheters, and a variety of orthopedic implants.

These compositions are derived from acrylic polyols that contain chemically bound (tethered) biocide moieties and are completely environment-friendly.

Benefits

- **GREEN TECHNOLOGY!** Impart antimicrobial properties via a contact-active, non-leaching (environmentally-friendly) mechanism.
- Display long-term antimicrobial properties toward the bio-medically relevant gram-positive bacterium, *Staphylococcus epidermidis*.

Invention Premise

This invention was a result of a research that was carried out to investigate the antimicrobial properties of novel polyurethane coatings containing tethered biocide moieties derived from the ubiquitous biocide, triclosan. The choice of triclosan as the biocide was attributed to its wide spread use in a large number of consumer applications.

Triclosan was first modified with an acrylate functionality and, subsequently, copolymerized with hydroxyethyl acrylate and butyl acrylate using conventional free radical polymerization to form an array of acrylic polyol terpolymers. Arrays of urethane coatings were produced from the array of acrylic polyol terpolymers

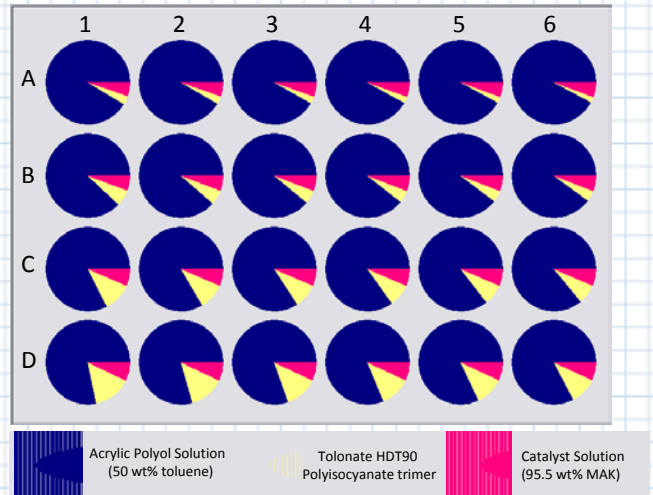
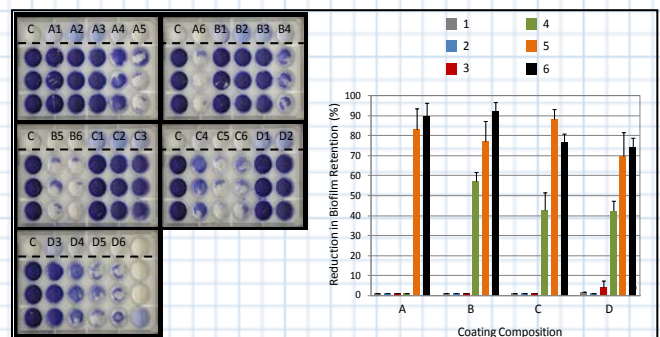


Illustration of the compositions of the polyurethane coatings produced using high-throughput workflow.



Evaluation of *S. epidermidis* biofilm retention.



and thereafter characterized using parallel dynamic mechanical thermal analysis, surface energy measurements, and various biological assays.

In order to investigate several compositional variables for its physical properties and antimicrobial activity against a suite of microorganisms, a combinatorial high-throughput workflow was utilized using sophisticated robotic tools.

Patents

This technology is patent pending with fully preserved world-wide patent rights available for licensing/partnering opportunities.

The Department of Coatings and Polymeric Materials at NDSU



This NDSU invention was created at the Department of Coatings and Polymeric Materials, an academic department within the College of Science and Mathematics at NDSU. The department provides the only academic research focused on polymer organic coatings in North America, and is one of only very few such departments in the world. The focus on polymer coatings at NDSU goes back to 1905, when many paints were based on vegetable oils and lead pigments. Research specialties include:

- Polymer, organic chemistry, responsive/structured polymers, nano-material synthesis
- Corrosion science, protective coatings, conductive polymers, electrochemistry
- Physical properties of coatings, polymer physics of cross-linked systems
- Computer modeling, service lifetime prediction

The Department of Coatings and Polymeric Materials has world class polymer, coating and corrosion characterization equipment in 20,000 square feet of the Research 1 building in the NDSU Research and Technology Park.

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