



## TECHNOLOGY SOLUTION

### Materials and Coatings



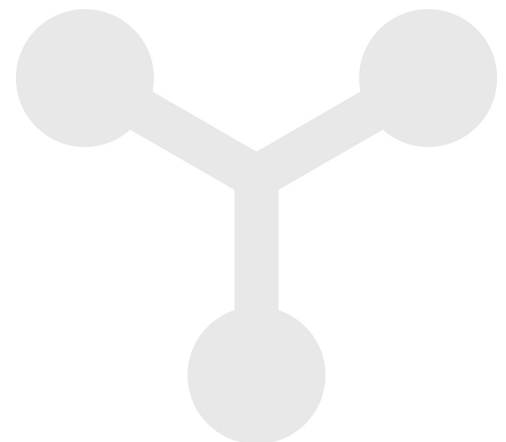
# Synthesis and Development of Polyurethane Coatings Containing Fluorine Groups for Adhesive Applications

## Contaminant resistant coatings for extreme environments

Accumulation of insect strikes on the leading edge of airplane wings is a more serious problem than one might realize. Depending on the magnitude, such accumulation changes the aerodynamic characteristics of the wing causing a change from laminar to turbulent flow and resulting in decreased lift and increased drag. Overall, this also results in decreased fuel efficiency. According to a study published in 1950, the drag coefficient measured on an aircraft wing was determined to increase as much as 100%. Although much work has been done to mitigate this problem. Proposed solutions include elastic surfaces, coatings, soluble films, and fluid covers. Each of these approaches had significant drawbacks.

### BENEFITS

- Elegant solution fulfills an unmet need
- Adds little weight
- Cost effective
- Saves fuel
- Improves flight safety



## THE TECHNOLOGY

Coatings offer an advantage over previous strategies due to ease of application, potentially negligible weight penalty, reduced environmental concerns, better economics, and continual function throughout the flight profile. In this present innovation, a particular coating has been developed that is similar to the basic component of a majority of aerospace coatings used on commercial aircraft. This coating was then sprayed from a solvent on various substrates. Once spray-coated on a substrate and dried, the coatings were then tested for adhesion mitigation of insect residues in a controlled insect impact facility propelled toward the engineered surface at approximately 150 mph. Once impacted, these coatings demonstrated hydrophobicity and a significant reduction in contaminant adhesion. The coatings were further tested in an operational environment on the eco-demonstrator Boeing 757 aircraft. The coatings resulted in lower insect accumulation than the control surface (no coating). The durability of these coatings was comparable to state-of-the-art formulations and satisfies current aircraft manufacturing requirements. These coatings likely have advantageous use in aerospace applications, wind turbine systems, and automotive industry, among other industries. This innovation not only appears to solve a problem that has persisted, thus fulfilling an unmet need, but also comprises a new composition of matter that can lead to numerous unforeseen applications.



NASA Tests Aircraft Wing Coatings that Slough Bug Guts

## APPLICATIONS

The technology has several potential applications:

- Reduction of insect impact residue on aircraft
- Prevention of insect adhesion on automotive windshields
- Anti-soiling coatings
- Improved weather ability of building exteriors
- Stain & corrosion resistance

## PUBLICATIONS

Patent No: 10,723,912