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Method of Thin Film Electrospray Deposition

Researchers at the University of South Florida have developed a method of forming a smooth thin film on a substrate within a short deposition time.

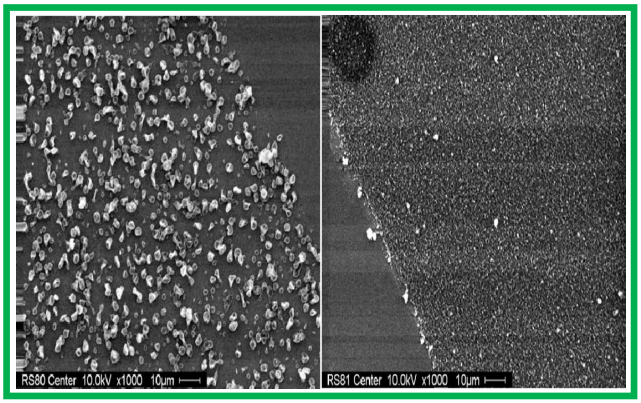
Electrospray is a method of applying thin film coatings in industrial applications. As the coating solution passes through a nozzle, the solution is subject to an electrical charge. The charged solution repels itself and, upon exiting the nozzle, disperses into small, highly charged droplets. Many polymeric materials do not form ions in solution. Electrospray thin film deposition of high concentrations of such polymer solutions often result in the deposition of rough films. This is noticeable if solutions of above certain polymer concentration are used. In order to fabricate smooth continuous films, the concentration needs to be kept low, which results in long deposition times. Hence, there is a need for a method that provides shorter deposition times and increased film quality.

Researchers at USF have created an electrospray-based deposition process, which strongly improves the control of thin film morphology. The invention is a method for electro-spraying highly concentrated solutions and obtaining a substantially two dimensional thin film. The invention also provides a method of cleaning impurities from the polymer thin film after electrospray deposition. The invention solves the problem of low-concentration/rough-coating application by introducing ionic substances (salts, acids, bases) to the solution to be sprayed. Potential applications of the technology are in the field polymer electronics, protective coatings, or antistatic coatings.

ADVANTAGES:

- **Improved spray deposition**
- **Shorter deposition times**
- **Increases film quality**
- **Allows the use of high concentrations**

Smooth Polymer Film Deposition



SEM Images of Polylactic Acid Films Deposited From Pure Solution (Left), and With an Added Ionic Compound TBH (Right)

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