

Multi-Tool Roll-to-Roll Manufacturing Line to Produce Multifunctional Polymer Films

Track Code: 2017-CAKM-67673

Categories:

- Electrical Engineering
- Materials and Manufacturing

Keywords:

- Crystallization
- Electrical Engineering
- Electronics
- Lasers
- Magnetics
- Materials and Manufacturing
- Micro & Nanotechnologies
- Polymers
- Sensors

There is an increasing need for multifunctional polymer films for a variety of applications including sensors, flexible electronics, displays, separation membranes, fuel cell membranes, and magnetic recording media. Currently, there is no technology that can enhance the wide range of polymer film properties substantially with the directed alignment of function enhancing nanoparticles utilizing external fields in thickness direction. This will help enhance electrical conductivity, thermal conductivity, ionic conductivity, dielectric constant in thickness direction while keeping the concentration of nanoparticle at very low levels. This facilitates retention of polymer flexibility and transparency while enhancing abovementioned properties

Researchers at Purdue University have developed a 45-foot continuous roll-to-roll platform that uses melt processing to organize nanoparticles in polymer films. It can be used on a wide variety of polymer platforms including photocurable monomers, polymer solutions, and polymer melts filled with nanoparticles for the first time. Because of the latter capability to organize nanoparticles in the melt, the process is environmentally friendly. The overall cost of processing is low.

Advantages:

- May be used on a wide variety of polymer platforms
- Processing cost is low

Potential Applications:

- Electrospinning
- Melt casting
- Electric field alignment
- Magnetic field alignment
- Laser heating
- Directional crystallization

People:

- Cakmak, Mukerrem (Project leader)

Intellectual Property:

Application Date: April 1, 2019

Type: NATL-Patent

Country of Filing: United States

Patent Number: (None)

Issue Date: (None)

Application Date: October 26, 2017

Type: PCT-Patent

Country of Filing: WO

Patent Number: (None)

Issue Date: (None)

Application Date: October 26, 2016

Type: Provisional-Patent

Country of Filing: United States

Patent Number: (None)

Issue Date: (None)

Contact OTC:

Purdue Office of Technology Commercialization
The Convergence Center
101 Foundry Drive, Suite 2500
West Lafayette, IN 47906

Phone: (765) 588-3475

Fax: (765) 463-3486

Email: otcip@prf.org