

# CHOOSING THE RIGHT SUBSTRATES FOR FLEXIBLE & PRINTED ELECTRONICS

Whether the choice is PET, PEN or paper, substrates have a large impact on the final application.

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The decision between types of substrates, whether it is paper, plastic film, metal or other, is critical in the design of printed electronics systems. Each of these substrates has its advantages and disadvantages. Whether one selects polyethylene terephthalate (PET), polyethylenenaphthalate (PEN), polyimide (PI), paper, foil or some other substrate, the performance characteristics of the substrate will impact the application.

Stefano Favero, division manager, Coveme Spa, noted that Coveme is a PET converter and buys polyester from major suppliers around the world. Coveme adds value to PET with specific treatments: functional coatings, temperature treatments or lamination.

“The PE industry is focusing on using PET, which is more resistant to tearing and humidity compared to paper, for instance, and cheaper than hi-temp solutions such as PI,” Favero noted. “PET has nice features, but these have to be controlled; I think about its natural shrinkage or the rolls’ skew. This is the know-how we have developed in almost 50 years.

“For the printed electronics market, we cover the polyester films specifically for flexible circuitry, RFID tags and NFC devices,” Favero added. “We apply ‘tca,’ a specific surface treatment that uses nanodimensional silica flakes; when it dries, you have basically changed the native PET surface tension, allowing targets of 58 dynes and up.

“This allows premium adhesion with conductive inks and pastes, but also with conventional inks and water-based or hot melt adhesives. Other print primers are also available, to complete the product range,” Favero added.

The latter coatings technologies are alternatives to surface treatment and are ideal for transparent applications.

“Surface treatments would turn a clear film hazy, and some customers require crystal clear substrates,” Favero reported. “When necessary, PET undergoes a heat stability process; in essence, we let the film go through a dedicated oven, whose temperatures can be tuned through its length and width in



Photo courtesy of Coveme.

different oven areas, reducing pulling tensions and allowing a controlled film shrinkage. Past 78°C (glass transition temperature), polyester starts to shrink; what Coveme does is master this dynamic and let the film relax.”

Arjowiggins Creative Papers’ PowerCoat is a relatively new technology for printed electronics. Launched in 2012, PowerCoat is a sustainable substrate with exceptional smoothness (the company reports as low as 10 microns). It is naturally roll-to-roll, and its smoothness allows for fine patterning as low as five microns. This makes it ideal for sensors, RFID tags, printed batteries and more.

“This paper has been in the making for years,” said Jose-Anne d’Auvergne, brand manager at Arjowiggins Creative Papers. “We not only saw a gap in the market, but we also believe that there is major potential for this recyclable, biodegradable paper substrate in the PE market.”