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Extended Abstract: submitted by R.Praino

A USDC-supported Phase I program focused on bench-scale activities to develop the basic process steps needed for R2R scale-up for creating patterned ITO coated substrate. This report will provide an overview of the novel roll-to-roll (R2R) manufacturing techniques being developed and utilized to demonstrate a viable route for the production of such patterned conductive layers on flexible polymer substrates.

The process begins with the formation of an “in-situ” polymer mask which serves as the template for either subtractive or additive process steps to create a conductive layer structure. Plasma etching processes are employed to selectively remove specific features depending on choice of process path (subtractive or additive). In the case of the additive process path, vacuum deposition processes are utilized to form the patterned conductive structure. In the case of the subtractive process path, multiple plasma processes are employed. For either process path, a final step removes the “in-situ” polymer mask, resulting in a well defined conductive structure.

In addition to summarizing the process, bench scale results for various aspects of the process will be presented. These results have driven the direction of additional development activities, as well as the design and startup of new R2R system to conduct pilot scale testing in a dynamic mode.