

The potential of deploying statistical design of experiments (DOE) in electrospinning and electrospraying for the rational development of advanced engineering materials

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Advanced manufacturing is a critical research area to overcome the challenge of the transition to a circular economy. Electrospinning and 3D printing are some examples of forefront innovative manufacturing that are poised to heavily impact the landscape of next-generation engineering materials, helping reducing (or eliminate) scrap materials, supporting de-manufacturing strategies, tackling “end-of-life” issues, and – in general - valorizing 2nd life materials and feedstocks. However, innovative manufacturing platforms host materials and processes that entail an intrinsic engineering complexity, which can be addressed via a rational approach to process control and product/component development. With a focus on electrospinning (and electrospraying) of engineering membranes, some example of the effectiveness of the deployment of factorial design from DOE in mapping the design domain vs. relevant process variables will be provided, thereby highlighting some key industrial areas of applications in the field of health, water treatment and energy storage.