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An Automated Approach to Calculating Collection Efficiency Through Analyzing Scanning Electron Micrographs (SEM) of Electro Sprayed Polyvinylidene fluoride (PVDF) Particles Using Machine Learning

Abstract

Polymeric microparticles have demonstrated great potential on applications involving drug delivery, biosensing, tissue engineering as well as actuating and sensing layers in devices. The electrospray technique, which leverages a high voltage electric field, was utilized to process the polymeric particles. The particles, during processing, have the capacity to "miss the target" of the designated collector due to the nature of the electro spraying mechanism. An important part of the electro spraying process is the analysis of the collection efficiency of the processed particles. This process often requires a data set iterative and hands on approach to obtain the collection efficiency calculations.

In this work, neural network algorithms were leveraged to analyze SEM micrographs of PVDF particles for particle size distribution and particle population density by automated means. The neural network algorithm performance was analyzed, and collection efficiency was recorded from algorithm output.

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