

Ultra-thin slot coating simulator for mapping the low-flow limit

Robert Malakhov †, Kristianto Tjiptowidjojo ‡, P. Randall Schunk ‡§

† Nanoscience and Microsystems Engineering Program
1 University of New Mexico
Albuquerque, NM 87131

‡ Department of Chemical and Biological Engineering
1 University of New Mexico
Albuquerque, NM 87131

§ Sandia National Laboratories
Albuquerque, NM 87185¹

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Slot-die coating is a precision pre-metered, film-deposition process compatible with a wide range of materials, including low-molecular weight polymers and thermosets. Of topical interest is the application of high-cost nanomaterial inks over moderately sized patches with sub-micron film thicknesses. In these applications coating speed can be moderate and start-up and shut down transients are important. A two-dimensional model has been developed to understand the limits of the process and to predict the thinnest possible film achievable for these applications. Coined as the *low-flow limit*, this boundary represents the minimum uniform, defect-free film achievable and is sensitive to the properties of the liquid and geometry of the die. In this work, we exhaustively explored the low-flow limit with our model to aid in the design and optimization of slot die coating of nanomaterials.

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