

# ANALYSIS OF OPERATING LIMITS OF VACUUM-ASSISTED SLOT DIE COATING OF HERSCHEL-BULKLEY FLUIDS

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## ABSTRACT

Shear-thinning and yield stress are two important rheological properties in the industrial using coating liquid, such as battery slurries. In this study, we use the Herschel-Bulkley constitutive equation to describe coating liquid flow. We develop a simple model by applying HB constitutive equation to the 1-D viscopillary model. Additionally, the visualization experiment is performed using a custom-made apparatus that mimics all essential industrial-grade slot coater features to detect the location of gas/liquid interfaces and contact lines.

All of the coating windows obtained through experiments and modeling were depicted on the dimensionless space. The shape of dimensionless coating windows obtained from various dimensionless numbers is similar. The effect of yield stress is insignificant in Bi (Bingham number) about 0.1. However, when the Bi and Rgt (gap-to-thickness ratio) become larger, the yield stress effect should be considered. The effect of shear-thinning changes the dimensionless coating window dramatically. In high Rgt cases, the shear field under the die lip drastically deviates from the simple shear flow, and the shear thinning effect becomes more considerable.

## REFERENCES

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