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Scale effects on double-screw granular mixing

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Abstract

Double screw pyrolyzers, featuring twin rotating screws, can be used to convert biomass into bio-oil via fast pyrolysis. Understanding the granular mixing dynamics within a double screw pyrolyzer is crucial to maximizing bio-oil yields. This study aims to investigate the effect of scale on mixing effectiveness in a cold-flow double screw pyrolyzer. Select operating conditions featuring changes in screw rotation speed, dimensionless screw pitch, screw rotation orientation, and particle size are compared for three double screw mixers of differing scales. Conclusions from this study provide additional insights into pyrolyzer scale-up and the mixing dynamics in larger scale granular mixers and the role that particle size plays in mixer scale-up. Advanced 360° optical visualization techniques, paired with non-invasive composition analysis were used to determine the mixing effectiveness of the screw mixer. In terms of mixer scale,

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