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Engineering Continuous Zeolite Crystallization

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Zeolites are ubiquitous in the fields of adsorption, separations and heterogeneous catalysis. Their widespread implementation is owing to the inherent range of tuneability of the microporous frameworks that accommodate a wide variety of adsorption, diffusion and reaction environments. Despite a half century of new frameworks and hierarchical structures, understanding the complex crystallization processes remains a challenge that convolutes transient heat, mass and kinetic effects within batch autoclaves. The work presented here aims to reduce this art form toward a science by controlling transport limitations and thermodynamic driving forces at the micro-scale while intensifying the process to adopt continuous flow methods.