

Abstract Submitted
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Visualization of turbulent reacting flow in a microscale nanoprecipitation reactor YANXIANG SHI, SOMASHEKAR VISHWANAT, MICHAEL OLSEN, RODNEY FOX — A flow visualization technique using the pH sensitive dye phenolphthalein was used to visualize and quantify turbulent reacting mixing in a microscale nanoprecipitation reactor. Phenolphthalein is colorless at pH lower than 8, but turns pink at higher pH, making it useful for visualizing acid-base reactions. Using this dye, turbulent reactive mixing in a confined impinging jets reactor (CIJR) was investigated. The reactor has two inlet streams, one at a pH of 3, and the other at a pH of 11. Phenolphthalein is also dissolved in both streams. A flash lamp with an extremely short pulse duration is used to freeze the turbulent motion of the fluids, and images are captured using a video camera. Quantitative mixing data are obtained by using a thresholding technique where local image intensities are transformed to binary signals which represent the local pH: 0 stands for pH lower than 8 and 1 for pH higher than 8. For each Reynolds number under consideration, thousands of realizations are acquired. Using this thresholding technique, probability density functions are obtained, allowing comparison to numerical simulations.

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