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Non-reacting and reacting experimental investigation of disparate viscosity turbulent mixing in a coaxial jet mixer to investigate mixing-limited consecutive competitive reaction systems[1] MICHAEL CAMERON AHMAD, GOKUL PATHIKONDA, MUSTAFA USTA, Georgia Instititute of Technology, IRFAN KHAN, Dow Chemical Company, CYRUS AIDUN, DEVESH RANJAN, Georgia Instititute of Technology — Industrial chemical processes often involve mixing limited reactions between fluids of disparate viscosities. The viscosity gradients within the reacting fluids lead to different mixing processes which significantly alter yield. The jet in co-flow served as a canonical case to perform this variable viscosity mixing study. The mixing physics for the disparate viscosity jet in coflow were captured with simultaneous high resolution PIV and PLIF. The resultant yield for the same flows was observed with a novel inline spectroscopic technique. The technique measured the products of reaction between 1-Napthol and Diazotized Sulfanilic acid. The concentrations of mono- (primary) and di-azo (secondary) reaction products were averaged diametrically visible-light absorption spectroscopy at various distances from the injector. Significant structural mixing differences were noted for cases with disparate viscosity. Increases in the viscosity disparity led to decreased selectivity of the desired product.

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Gokul Pathikonda
Georgia Inst of Tech

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