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Schlieren Imaging of Chemically-Induced Flow Instabilities During Step-Growth Polymerization PATRICK BUNTON, MICHAEL RAWAT, SIMONE STEWART, Department of Physics, William Jewell College, ANNE DE WIT, Nonlinear Physical Chemistry Unit, Universit Libre de Bruxelles, Bruxelles, Belgium, JOHN POJMAN, Department of Chemistry, Louisiana State University, Baton Rouge, LA, USA — Schlieren imaging was used to observe the dependence on degree of reactivity on flow instabilities during step-growth polymerization. For example a solution of a 2,2'-(ethylenedioxy)- diethanethiol containing varying concentrations of Octylamine as initiator was used to displace a trimethylolpropane triacrylate monomer. The concentration of initiator was used to control the degree of reactivity of the solutions and therefore the Damkohler Number which is the ratio of the chemical to the hydrodynamic timescale. By varying the concentration of initiator and/or the functionality of the monomers, one can tune the reaction product from a viscous liquid, to gel, or even a solid. Resulting flow patterns were found to depend on degree of reactivity and effects were observed regardless of the direction of flow. Also observed was evidence of three-dimensional effects on the resultant flow patterns.

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