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Self Organization via Frontal Polymerization

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There are three modes of frontal polymerization: Isothermal, Photo and Thermal Isothermal frontal polymerization (IFP) is a directional polymerization that utilizes the Norish-Trommsdorff effect, to produce optical gradient materials. When a solution of methyl methacrylate and thermal initiator contacts a polymer seed (a small piece of poly(methyl methacrylate), a viscous region is formed in which the polymerization rate is faster than in the bulk solution. PhotoFP is driven by a continuous input of light. Thermal frontal polymerization is the propagation of a localized reaction zone through the coupling of thermal transport with the Arrhenius dependence of the kinetics of an exothermic polymerization. We will examine IFP and its use in making Gradient Optical Materials (GRIN) and our work on elucidating the mechanism. We will consider how thermal frontal polymerization can be used rapid rapid repair, making gradient materials and to study interesting nonlinear modes of thermal front propagation.