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Photosensitive chemical reactions in patterned microchannels OLGA KUKSENOK, ANNA BALAZS, Chemical Engineering Department, University of Pittsburgh, Pittsburgh, PA — Through computer simulations, we study the behavior of a A/B/C ternary mixtures in which two immiscible components, A and B, undergo a photosensitive chemical reaction and produce third component, C. The reverse chemical reaction, namely consumption of the A and B species from the C components, is also possible. Initially, two parallel fluid streams, A and B, are driven by an imposed pressure gradient (Poiseuille flow) through the three dimensional microchannel. The microchannel is decorated with patches that have specific interactions with different components of the mixture. The presence of the patterned substrates enhances chemical reactions in the system since it diverts two initial parallel fluid streams and creates additional interfaces between A and B components. We consider the case where chemical reactions rates can be controlled externally by the light irradiation. We show that by applying time-dependent light irradiation, we can precisely control the distribution of each component within the channel, as well as to tune dynamically the properties of the patterned substrates.

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