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Photopatterning in phase separating reactive ternary systems PRATYUSH DAYAL, OLGA KUKSENOK, ANNA BALAZS, University of Pittsburgh — We investigate a ternary ABC phase separating system in which components A and B undergo reversible photochemical inter-conversion reaction while component C remains non-reactive. We focus on systems with unequal forward and backward reaction rates. It has been well known that in such binary systems the competition between phase separation and chemical reaction results in hexagonal patterns contrary to lamellar structures for equal reaction rates. Since the chemical reaction favors miscibility a phase diagram is established to determine the phase boundary of such systems. We demonstrate that by confining chemical reaction to designated places using masks more complicated structures could be formed in the binary AB systems. We elucidate the scenarios in which the third non-reactive C component results in the displacement of AB domains from the reaction sites in favor of C. This migration is driven by difference in the free energies between the reaction sites and the masked regions. A rich variety of complex super-lattice patterns can be formed by changing the processing variables such as initial concentration, distance between the masks and rates of forward and backward reaction.

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