

Monolithic and flexible fluoropolymer film microreactor for organic synthesis applications

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Photocurable and viscous fluoropolymer with chemical stability is a highly desirable material for fabrication of microreactors. Lack of reliable fabrication method, however, limits actual applications for organic reactions. Herein, we report fabrication of a monolithic and flexible fluoropolymer film microreactor and its use as a new microfluidic platform. The fabrication involves facile soft lithography techniques that enable partial curing of thin laminates, which can be readily bonded by conformal contact without any external forces. We demonstrate fabrication of various channels such as those embedded with either a micromixer pattern or a droplet generator. Organic reactions under strongly acidic and basic conditions can be carried out in this film microreactor even at elevated temperature with excellent reproducibility. In particular, the transparent film microreactor with good deformability could be wrapped around a light-emitting lamp for close contact with the light source for efficient photochemical reactions with visible light, which demonstrates easy integration with optical components for miniaturized systems.