

A polymeric nano-adhesives and its application to microfluidics

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Although micro-mixers have been developed to shorten the mixing time, they are complicated to construct and fluid specific. Such an issue can be overcome by mixing the streams using turbulence. Here, we have developed a turbulent microfluidic Y-mixer with commonly used poly(dimethylsiloxane) (PDMS) and glass substrate by bonding the two substrates with a super-strong nano-adhesive layer deposited via initiated chemical vapor deposition (iCVD). The turbulent microfluidic mixer developed in this work is operable at a total flow rate of 40 ml/min allowing the fluids to mix immediately upon contact. Image analysis also indicates that the mixing starts as soon as the fluids are introduced into the mixer. Moreover, the pressure measurement results are similar to the simulation values for turbulence. We believe that the turbulent microfluidic mixer developed in this work will not only allow immediate mixing between the streams as well as increase the throughput of microfluidic reactors.