Micro-Engineering and Nano-Technology Research

Rapid Mixing Micromixer for Drug Discovery Purpose

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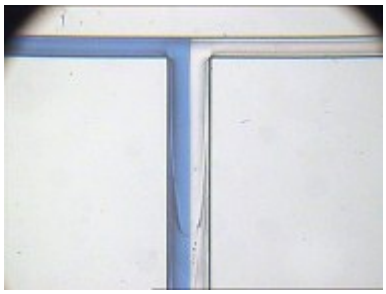
Description

Current research involves designing, fabricating and testing a silicon micromixer that is able to completely mix two biological fluids (enzymes and antibiotics) together within a millisecond for infrared spectroscopy. This device uses only a minute amount of each reagent - less than a microlitre per reagent, thus economical analysis, while produces sufficient mixture for infrared spectroscopy analysis.

Applications

A rapid mixing micromixer is used for sample preparation in reaction kinetics studies between target enzymes and antibiotics. This enables the early events of reaction mechanism to be resolved. Information of reaction kinetics is useful in the discovery of new antibiotics. Rapid mixing micromixers are also very useful in sample preparation stage of other chemical and biochemical analyses such as in protein folding analysis.

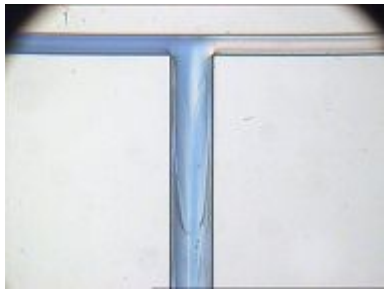
Results



0.20 bar

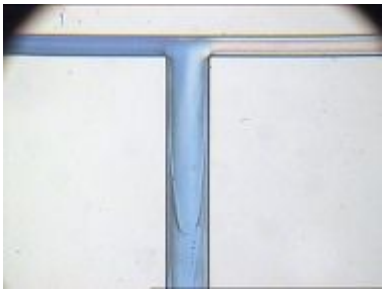
0.91 bar

1.56 bar



2.03 bar

2.58 bar



3.41 bar

The micrographs show the mixing of a blue colour dye with clear water. At a pressure of below 1 bar, the liquids flow in the outlet channel of 100 microns wide in a laminar fashion and mixing is only by diffusion. But when pressure is increased progressively to 3.41 bar, homogeneous mixture is obtained at the outlet.

Publications

1. Wong, S. H. and Ward, M. (2002). 'Rapid mixing in a micromixer with turbulence-inducing elements for reaction kinetics studies'. Proceedings of the Eighth Annual Postgraduate Research Symposium, Birmingham, UK, pp 6-10.

2. Wong, S. H. and Ward, M. (2002). 'Investigation of mixing in a cross-shaped micromixer with turbulence inducing elements for reaction kinetics studies'. Proceedings of the 16th European Conference on Solid-State Transducers, Prague, Czech Republic, pp 431-432.

3. Wong, S. H., Bryant, P., Ward, M. and Wharton, C. (2003). 'Investigation of mixing in a cross-shaped micromixer with static mixing elements for reaction kinetics studies'. Sensors and Actuators B. (In Press)