

Membrane-free micro-reactor and micro-separator with superamphiphobic silicon nano-structures

고동현, 김동표<sup>†</sup>

POSTECH

(dpkin@postech.ac.k<sup>†</sup>)

For higher mass transfer between gas and liquid streams, those streams are usually separated by a membrane. With the lack of separating membrane, gas stream would be present as bubbles in liquid stream or, in case of a microsystem, as gas plugs between liquid slugs. Contact between the two moving streams with continuous and direct manner is quite an efficient way of achieving highest mass transfer between the two phases. Herein, we report a silicon-nanowire-based microsystem in which a liquid stream flows in contact with an underlying gas stream. The upper liquid stream does not penetrate into the lower gas stream due to the superamphiphobic nature of the silicon nanowires, thereby preserving the integrity of continuous gas and liquid streams, although they are flowing in contact. The microsystem provides the best possible interfacial mass transfer known to date between flowing gas and liquid phases, which can achieve excellent chemical performance in two-phase organic syntheses