

Improvement of C1 gas uptake for efficient C1 gas biotransformation using biocompatible organic nanofluid

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The biological conversion of C1 gas (CH₄, CO) has the potential to produce useful biochemicals environmentally friendly and efficiently at mild conditions (low temperature and low pressure), but the reaction rate and productivity have been hampered industrial utilization. It has been required to overcome low C1 gas solubility and low mass transfer efficiency in aqueous environment, based on the understanding of C1 gas microbial biotransformation system. In this aspect, nanofluid, a fluid containing nanoparticles stably suspended in water with a size of ~ 100 nm, could be considered as a significant enhancement system for improving mass-transfer coefficient and apparent gas solubility, although some issues such as cell toxicity and economic preparation should be solved for biological utilization. Here, a nanofluid system based on biocompatible organic nanoparticles was designed to improve the C1 gas uptake efficiency, and the system was applied to significant C1 gas bioconversion processes. We tried to understand C1 gas utilization enhancement in the organic nanofluid system, and the detailed results will be presented.