

## Microfluidic Production of Smart Microcapsules for Advanced Control of Permeability

김지원, 이상석<sup>1</sup>, 박진호<sup>2</sup>, 구민희<sup>2</sup>, 양재문<sup>2</sup>, 김신현<sup>†</sup>

KAIST; <sup>1</sup>KIST; <sup>2</sup>연세대학교

(kim.sh@kaist.ac.kr<sup>†</sup>)

Cells are enclosed with semi-permeable membranes. Therefore, they can protect genetic materials from surroundings while allowing useful molecules. This molecule-specific permeation is important in cell growth, and inspired from it, microcapsules with size- or charge-dependent permeability have been developed. Beyond these simple permeability accomplished by porous membrane, here, we suggest a new microcapsule with polarity- and temperature-dependent permeability. Uniform microcapsules were produced by microfluidic production of double emulsions, and their membranes were comprised of polymeric framework filled with phase change material (PCM). As molecules should dissolve into the oil PCM gate for permeation, the permeability was certainly affected by the polarity and the temperature. We proved their permeability by using confocal microscopy, ultraviolet-visible spectroscopy, and in-vivo fluorescence imaging system. This study suggests a new ability for advanced transmembrane transport, showing the great potential as a smart microcarrier, microsensor or microreactor.