

Design of thermo-responsive microcarriers for smart release of hydrate inhibitors

이상석, 박주운¹, 서유탉¹, 김신현[†]

한국과학기술원; ¹서울대학교

(kim.sh@kaist.ac.kr[†])

When the small hydrocarbon guest molecules can be trapped in network of cages of water molecules, hydrates are formed at low temperature and high pressure. Formation of hydrate in pipe line can cause serious plug problem. To ensure flow assurance, risk management in hydrate plug prevention is necessary. In this work, we report a new strategy for hydrate inhibitor deliver system using microcarriers which can release of low dosage hydrate inhibitors by temperature dependent mechanical property. We prepare double-emulsion drops composed of an aqueous core containing hydrate inhibitor and a shell of photocurable resin, then double-emulsion drops are exposed to UV light to polymerize the monomer. We control ratio of shell thickness over radius of microcarrier by adjusting volumetric flow ratio of injected fluid to give shell different mechanical strength. The Young`s modulus of microcarriers can be bigger at lower temperature and this change is effective influence for breaking up the microcarriers by thickness of shell. Therefore, we can control the release behaviour of hydrate inhibitor by shell thickness of microcarriers at specific temperature.