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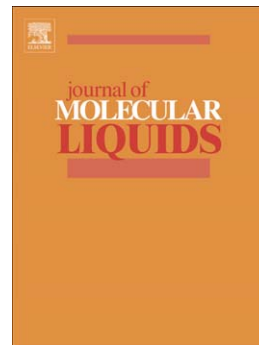
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Enhanced methane hydrate formation with SDS-coated Fe₃O₄ nanoparticles as promoters

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Abstract

Nano metal fluids have been applied to promote the formation of natural gas hydrates. In this work, the sol of SDS@Fe₃O₄ (named as SDS@Fe₃O₄) were prepared and used as promoters in methane hydrate formation. Compared with SDS, SDS@Fe₃O₄ produced much better promotion and the main superiority was that SDS@Fe₃O₄ could significantly shorten the induction periods of hydrate formation. When SDS was used, the induction periods lasted about 40-60 min, while when SDS@Fe₃O₄ was used at the same concentrations, hydrates nucleated within 10 min, especially, even no obvious induction periods were observed when SDS@Fe₃O₄ was used in some experiments. Particle size showed significant influences on the promotion of SDS@Fe₃O₄ to methane hydrate formation and smaller particles resulted in rapider hydrate formation. In addition, SDS@Fe₃O₄ showed excellent repeatability during the hydrate formation-dissociation cycles.

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