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A novel CO2-responsive microgel for in-depth conformance control in CO2 enhance oil recovery (EOR)

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CO2-EOR (enhanced oil recovery) represents one of the most cost-effective methods for achieving carbon neutrality. However, CO2 flooding encounters serious preferential flow in porous mediums, which significantly reduce the economic benefits of CO2-EOR and exacerbate the risk of CO2 leakage. This study synthesized a tertiary amine-based, CO2-responsive microgel. The microgel possesses a particle size of ~7.50μm in neutral formation water and expands to 2-4 times upon contact with CO2, thereby offering advantages in deep profile modification and selective CO2 plugging. Core flooding experiments confirmed the microgel's effectiveness in deep profile modification and EOR in heterogeneous reservoirs.

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Primary author: WU, Qihui

Co-author: Mr ZHONG, Junjie (National Key Laboratory of Deep Oil and Gas, China University of Petroleum (East China))

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