



Contribution ID: 59

Type: **Oral Presentation**

Characterization of oilwell cement with Ca-montmorillonite additives modified by supercritical CO₂

Thursday, 25 May 2023 14:00 (15 minutes)

High concentration CO₂ invades oilwell cement under geological CO₂ storage or sour oil and gas exploitation conditions. Long-term invasion of CO₂ makes oilwell cement structure unstable and prone to damage. For the reinforcement of oilwell cement, Ca-montmorillonite (Ca-MMT) was modified using supercritical CO₂ (ScCO₂) as the solvent and intercalator. The micro-calcite bearing Ca-montmorillonite (MC Ca-MMT) was added to the cement slurry to reinforce the oilwell cement after the modification. Microcrystal calcite was identified in the MC Ca-MMT through transmission electron microscopy (TEM) and selected-area electron diffraction (SAED) analyses. The mechanical properties and microstructural evolution of the MC Ca-MMT reinforced oilwell cement were investigated, revealing that the carbonation was inhibited by MC Ca-MMT. Through the analysis of microcrystal formation and densified carbonation area, the CO₂-resisting mechanisms of MC Ca-MMT reinforced oilwell cement were revealed in this study.

Participation

In-Person

References

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Primary authors: Prof. ZHANG, Liwei (Institute of Rock and Soil Mechanics, Chinese Academy of Sciences); MEI, KAIYUAN (Institute of Rock and Soil Mechanics, CAS); Ms WANG, Yan; Prof. CHENG, Xiaowei

Presenter: Prof. ZHANG, Liwei (Institute of Rock and Soil Mechanics, Chinese Academy of Sciences)

Session Classification: MS10

Track Classification: (MS10) Advances in imaging porous media: techniques, software and case studies