ICCDU XVI
27-30 August, 2018
Rio de Janeiro, Brazil

16th INTERNATIONAL CONFERENCE ON CARBON DIOXIDE UTILIZATION

Porosity at the interface of organic matter and mineral components contribute significantly to gas adsorption on shales

Jialin Shi,[a, b] Guofei Shen,[a] Hongyu Zhao,[a] Nannan Sun,[a,*] Xuehang Song,[a] Yintong Guo,[e] Wei Wei,[a, c, e, *] Yuhan Sun[a, c]

[a]CAS Key Lab of Low-Carbon Conversion Science and Engineering, Shanghai Advanced Research Institute, Chinese Academy of Sciences, Shanghai, 201210, China.
[b]University of Chinese Academy of Sciences, Beijing, 100049, China.
[c]School of Physical Science and Technology, ShanghaiTech University, Shanghai, 201210, China.
[d]Center for Excellence in Urban Atmospheric Environment, Institute of Urban Environment, Chinese Academy of Sciences, Xiamen, 361021, China.
[e]State Key Laboratory of Geomechanics and Geotechnical Engineering, Institute of Rock and Soil Mechanics, Chinese Academy of Sciences, Wuhan, 430071, China
Corresponding author: sunnn@sari.ac.cn, weiwei@sari.edu.cn

Keywords: CO_2, Shale gas, Enhanced recovery

ABSTRACT: Recent research evidenced that organic matter (OM) in shale is the major control on its adsorption behavior, but in some cases, mineral components (MC) may also play a role. Herein, we focus on the alteration of porosity due to the presence of OM-MC interface and their influence on gas adsorption, these cannot be simply attributed to either OM nor MC as frequently reported in the previous publications[1]. In this context, OM from a shale sample was purified following reported methodology, while a universal procedure for extraction of MC was established. Further studies on the porosity and adsorption behavior were carried out on OM, MC, shale, and a hypothetic mixture (HM) from OM and MC bearing the same composition of shale. For the first time, we demonstrate experimentally the profound effect of porosity at the OM-MC interface on gas adsorption of shales particularly at temperatures more relevant to reservoir conditions. The current work deepened the understanding on gas adsorption of shale, and thus shed meaningful lights on related areas such as gas-in-place (GIP) estimation, CO_2 sequestration in shales, and particularly the utilization of CO_2 for enhanced shale gas recovery.

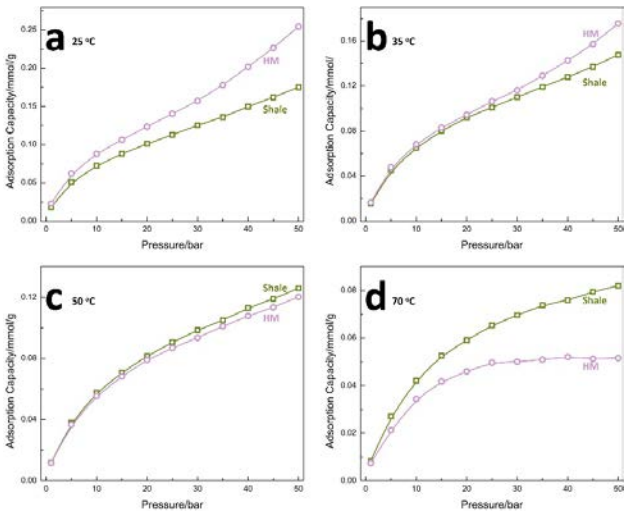

Figure 1. Comparison of CH4 adsorption on Shale and HM at a) 25 °C. b) 35 °C. c) 50 °C. d) 70 °C.

Acknowledgments

This work was supported by the Strategic Priority Research Program of the Chinese Academy of Sciences (XDB10040200) and the National Natural Science Foundation of China (Grant No. 51404235).

References

[1] J. Xiong, X. Liu, L. Liang, Q. Zeng, *Fuel* **2017**, 200, 299.