Geophysical Research Abstracts
Vol. 19, EGU2017-19563-5, 2017
EGU General Assembly 2017

Photoacoustic as a unique tool for studying multicomponent gas transport processes through rock samples

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Improvement of natural gas extraction is one of the constant challenges of gas industry. Gas transport through the material of the reservoir is driven by two forces. Conventional diffusion driven by the concentration gradient and the Darcy flow driven by the differential pressure at the two ends of the material. Their segregated yield and their interrelation is largely influenced by the intrinsic structure of the sample so their measurement can yield important information There are multiple methods for measuring these parameters (Sander et al, 2017).
We present a measurement set-up which uses photoacoustic spectroscopy for the detection of the transported components. It is a highly sensitive and selective measurement method (Bozóki et al., 2011) and can be used to measure concentration through 4-5 orders of magnitudes. Furthermore it can be operated fully automatically, has response time in the second range and outstanding long term stability. This allows us to perform measurements on a wide variety of samples either in static or in dynamic mode under different conditions and various analytes. Furthermore transport of several gas components can be measured simultaneously. Our set-up facilities measurements in a wide pressure, temperature and concentration range.

Bozóki Z., Pogány A., Szabó G. (2011), Applied Spectroscopy Reviews 46, 1-37
Sander, R., Pan, Z. and Connell, Luke D. (2017), Journal of Natural Gas Science and Engineering 37, 248-279.