

Porosity is one of the most significant petrophysical parameters in fine-grained sedimentary formations. Coupled together with permeability, these parameters shape the potential of source rock for hydrocarbon storage and migration. Porosity of fine-grained shales and mudstones is still a hot topic in hydrocarbon resource studies, mostly because of increasing interest caused by development of shale gas and oil exploitation. Many years of porosity studies revealed, that amount of total porosity in rock is changing with increasing thermal maturity of source rock. In most cases, those changes have a decreasing trend, nevertheless, during thermal maturation, some processes are initiated which can lead to enhancement of total rock porosity. One of such processes is interaction between organic acids and mineral components of the rock, resulting in partial dissolution of minerals. Organic acids are generated as a result of primary organic matter transformations during thermal maturation. So far, it was established that acids are able to partially dissolve vulnerable minerals and influence the volume of secondary porosity. However, range of these processes is not fully explained and require more further studies.

In this project we plan to research the amount of organic acids released during organic matter thermal conversion and assess the influence of organic acids on development of secondary porosity in rocks. In order to reach the goal of the project, we plan to conduct research in three main stages: *source rocks pyrolysis*, during that stage, immature rock samples will be heated in order to reach pre-determined thermal maturities; *type and amounts of organic acids analyses*, we plan to use ion chromatography method to define changes in amounts of organic acids generated during artificial maturation of rocks; *evolution of total rock porosity*, at each stage of thermal maturity we will conduct porosity measurements and imagining. All the analyses will allow to create model of secondary porosity evolution with increasing thermal maturity.

Research in the area of organic acids and their impact on porosity development have been limited after 90's of XX century. Nowadays increase of interest in fine-grained formation, due to shale oil and gas exploitation introduced new demand for source rocks porosity studies, its changes with thermal maturity and factors influencing its development. Exact understanding of the processes affecting porosity and coupled permeability, will allow to maximize exploitation.

Complex approach to the project research area, as well as application of state-of-the-art analytical techniques, which were not applied in previous studies, will allow to rearrange current state of knowledge about organic acids generation and their interactions with carbonates and aluminosilicates of host rock. We expect to quantify secondary porosity formed through partial dissolution of minerals at contact surfaces with acids. We also plan to create a model of total rock porosity changes at different stages of thermal maturity, according to amounts of generated organic acids. Realization of this project will introduce modern approach in the presented field of science and will finally determine the impact of organic acids on secondary porosity development.