The Lower Paleozoic shales on the western margin of the East European Craton in Poland were recently targeted for exploration as possible unconventional resources of hydrocarbons. Tens of exploratory wells were drilled within the last decade, some of which were horizontal and subject to hydraulic fracking stimulation to assess shale gas potential. So far, the results are not promising, although shale gas was encountered the amount of shale gas is below the economic threshold for exploitation at the moment.

Pore network within organic matter rich shales is responsible for transport, sorption and gas storage capacity, the latter very important for unconventional shale gas resources. Porosity in shales consists of inorganic mineral matrix pores and pores hosted within organic matter. The latter are the most important for shale gas storage capacity. In this project we plan to study porosity within organic matter of the Lower Paleozoic shales on the western margin of the East European Craton in Poland.

It is known that different organic matter constituents, called macerals, differ in chemical and physical properties and the porosity between them can vary substantially. The hypothesis for this project is that variations in distribution of different organic matter components can strongly affect organic matter hosted porosity and pore size distribution of shales and therefore be the main factor controlling gas storage capacity of shales.

One of the main macerals in Ordovician and Silurian shales from the western margin of the East European Craton, graptolite remnants, is a zooclast (remnant of a small animal) and thus quite different chemically and physically from regular plant, algae and bacteria derived organic matter. Only a few scientific papers report porosity within graptolite remnants and they present contradicting information. This project through detailed organic petrography analysis of variations in maceral composition combined with parallel tracking of changes in organic matter porosity will allow to better understand influence of maceral composition on gas storage potential.

The outcome of this project will be estimation of organic matter porosity which will allow to forecast highest gas storage potential zones based on maceral composition. Additional benefits will include evaluation and publication of maceral composition data within several selected vertical profiles from recently cored gas shale intervals.