

Ending fossil fuel sources make it necessary to seek unconventional sources of energy. One way of producing the unconventional energy is biomass conversion into a flammable biogas comprising methane, hydrogen, carbon monoxide (II) and hydrocarbons. The current technological achievements allow to convert biogas into the energy using biogas turbines. Unfortunately, during the energy production, some hazardous gases may be present in effluent gases. Due to the EU Waste Incineration Directive Strict regulations the effluent gases has to be purified to the certain level.

Over the many methods of purifying exhaust gas, catalytic methods for the removal diluted harmful compounds are most effective. However, the technological units for gas exhaust abatement has been developed over 30 years ago. Those technological solutions have many disadvantages, among others, large size installation (approx. 10 m) and the high price. Currently, operating systems are based mainly on catalysts containing precious metals. The use of noble metal catalysts because of their price and a small temperature range, which effectively operate is limited.

It is therefore necessary to develop modern reactors that would eliminate conventional reactors limitations. The application of short channel structured reactors based on transition metal oxides which would obviate the inconveniences. Such reactors are characterized by a specific structure, similar to the cut to pieces of honeycomb. Thanks to this structure mass and heat transport inside the reactor is bigger than in traditional monoliths. However, the efficient abatement unit is not only the structured reactor. The activate the process the active material has to be deposited on the structured carrier the most controlled manner.

The conventional deposition methods such as impregnation or sol-gel methods no not allow for the precise definition of the structure and size of the deposited active material. However, the novel synthesis method assisted by ultrasonic field allows you to obtain strictly designed nanostructures, through the appropriate choice of duration and power of ultrasound employed. Moreover, the catalyst activity can be modelled by selection of the preparation conditions. To determine the activity and thoroughly understand the mechanisms on the surface of the catalysts in the individual elementary acts it is necessary to use advanced spectroscopic and microscopic techniques dedicated for surface analysis. The combination of information about the structure and texture of the catalyst while measuring its effectiveness allows to obtain fundamental information on the impact of preparation on the effectiveness of the system.