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It is generally accepted that world's main resources of fossil fuels will be depleted during the oncoming decades. Looking for adequate alternatives of new and renewable sources of energy is one of most important tasks of contemporary science [1]. Nowadays "western civilization" depends strongly on the use of fossil fuels although their mining and production are increasingly expensive. In addition, significant increase of air pollution with different carbon containing substances like aromatic hydrocarbons or carbon black takes place. One of the possible alternatives is intensive exploitation of biogas, a "dormant" byproduct of some industrial and agricultural processes today. Besides the varying CH_4/CO_2 ratio, the humidity and corrosive gases present in biogas still constitute a major problem for biogas industrial utilization (fuel for cars or pipeline). Therefore, the most feasible way of converting the chemical energy stored in biogas to heat or electricity is now still combustion. The combined heat and power plants are usually connected directly to the biogas sources like sewerage plants [2], landfills and farms.

In this contribution we propose a method to upgrade biogas to the same quality of fuel standard natural gas. The latter contains more than 95 vol. % of methane. Using traditional membranes, such concentration of methane in the retentate could only be achieved using a multistep process. A recently proposed method for raw biogas purification from impurities and carbon dioxide by condensing water on swollen thin film composite membranes was found to be highly effective [3]. The hydrophilic reverse osmosis membrane promotes the formation of a very thin selective water layer under condensing conditions below the dew point of the raw biogas feed. The large difference in permeability of the impurities in raw biogas (carbon dioxide, hydrogen sulfide) and methane through the water layer enables upgrading of raw biogas to biomethane quality in a single stage. Contrary to the classical purification processes, the proposed method does not require any biogas pretreatment, which makes this approach economically attractive. It represents an innovative approach to production of biomethane from biogas.

References

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