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Physicochemical modification of natural and synthetic zeolites as a way to obtain advanced Hg0 sorbents

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The natural Clinoptilolite (HEU framework) as well as synthetic zeolites, mostly A and X (from LTA and FAU) frameworks were used in this study. Synthetic zeolites were derived using wastes as a source of silica and alumina. Both natural and synthetic zeolites were modified through a series of physicochemical treatments in order to create ability for elemental mercury (Hg0) removal from simulated gas stream. Mercury constitutes a hazardous threat, due to its high chemical and biological activity, durability, volatility and susceptibility to migrations over long distances from the source of pollution. According to the Agency for Toxic Substances and Disease Registry, mercury is placed third on the list of substances most hazardous to human health. The effect of zeolites modification on Hg0 removal from simulated gas stream was studied empirically using prototype installation designed to test the effectiveness of sorption by solid state sorbents. Part of the studied zeolites revealed significant mercury uptake during sorption experiment. The proposed hybrid synthesis method possesses the potential to be implemented for both waste utilization as well as the time and energy saving production of aluminosilicate, porous materials with high Hg0 removal efficiency.

Biography:

Piotr Kunecki completed his MSc studies in 2014 at AGH University of Science and Technology in Krakow, Poland. In 2015-2018, he worked as a research assistant at the Lublin University of Technology, taking part in two research projects. From 2017, he started working as a research assistant at the Mineral and Energy Economy Research Institute of the Polish Academy of Sciences, where in October 2021 he defended his doctorate and started working as an assistant professor. From January 2021, he is also prime investigator of the project supported by the National Science Center, Poland, grant no. 2021/41/N/ST5/03214.