



Contribution ID: 109 Contribution code: P3.1-109

Type: e-Poster

## Investigation of the sorption and separation characteristics of materials for argon extraction and processing

*Thursday, 1 July 2021 09:15 (15 minutes)*

A method for detecting radioactive argon  $^{37}\text{Ar}$  produced in the soil by the nuclear reaction between  $^{40}\text{Ca}$  and fission neutrons is used for monitoring and detection of underground nuclear tests. In this regard, a relevant problem is to extract argon from soil gas with the elimination of impurities and conduct radioactive analysis. An industrial technology of low-temperature air rectification allows argon extraction in large quantities. However, this technology is prohibited by the CTBTO for on-site inspection purposes. This work is devoted to the study of materials for argon extraction and processing using the adsorption method and, in particular, the pressure swing adsorption (PSA) method. Traditional noble gas sorbents are used as materials, as well as high-silicon zeolites modified with transition metal nanoparticles (of the Y and ZSM-5 types), which feature an increased selectivity for argon. The study is carried out on a setup for examining the sorption and separation characteristics of sorbents. The technique for determining the characteristics of argon sorbents is based on the volumetric method (in the high-pressure range) and the preparative gas chromatography method.

### Promotional text

The study of materials for argon extraction and processing allows to determine the sorbents with the highest selectivity for argon and to provide the possibility to conduct analysis of its radioactivity with the aim of underground nuclear test monitoring and verification.

**Primary authors:** Mr ALEXANDROV, Roman (All-Russia Research Institute of Automatics named after N.L. Dukhov (VNIIA), Moscow, Russian Federation); Mr TKACHEV, Oleg (All-Russia Research Institute of Automatics named after N.L. Dukhov (VNIIA), Moscow, Russian Federation)

**Co-authors:** Mr CHERNOV, Mikhail (All-Russia Research Institute of Automatics named after N.L. Dukhov (VNIIA), Moscow, Russian Federation); Mr ERGASHEV, Damir (All-Russia Research Institute of Automatics named after N.L. Dukhov (VNIIA), Moscow, Russian Federation); Mr GERASIMCHUK, Oleg (All-Russia Research Institute of Automatics named after N.L. Dukhov (VNIIA), Moscow, Russian Federation); Ms GORYACHEVA, Nadezhda (All-Russia Research Institute of Automatics named after N.L. Dukhov (VNIIA), Moscow, Russian Federation); Mr ORLOV, Maksim (All-Russia Research Institute of Automatics named after N.L. Dukhov (VNIIA), Moscow, Russian Federation); Mr TIMOFEEV, Dobrynya (All-Russia Research Institute of Automatics named after N.L. Dukhov (VNIIA), Moscow, Russian Federation)

**Presenter:** Mr ALEXANDROV, Roman (All-Russia Research Institute of Automatics named after N.L. Dukhov (VNIIA), Moscow, Russian Federation)

**Session Classification:** T3.1 e-poster session

**Track Classification:** Theme 3. Verification Technologies and Technique Application: T3.1 - Design of Sensor Systems and Advanced Sensor Technologies