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Some features of zirconium isotopes separation by the method of laser assisted retardation of condensation

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Commercial ores used for deriving zirconium for pressurized water reactor parts have a hafnium contents amounting to 1-2%, which along with Zr-91 deteriorates fuel utilization efficiency substantially (fuel cost saving of 7% would result provided only Zr-90 is left). Therefore, some cheap way to eradicate them is in required. Possibility of using purification method based on laser assisted retardation of condensation is investigated. In this method, proper choice of molecule for selective excitation of target isotope is crucial. Because of significant overlap photo-absorption spectrum of dicyclopentadienyl zirconium dicyanate with CO₂ laser emission

spectrum along with high vapor pressure at relatively modest temperature, these molecules were selected. On the basis of transport model, developed by Jeff Eerkens for this method, enrichment factor and product cut evolution over gas flow core pressure and temperature are found. Due to lack of experimental data on dimer bond vibrational spectra, the latter have been derived by using Gaussian software. Nozzle wall profile, that can provide temperature and pressure, corresponding to the maximum of enrichment factor, has been calculated as well.

Biography

Konstantin Lyakhov has earned PhD in theoretical physics from J.W. Goethe University (Frankfurt) in 2008 at age of 29. The title of my thesis was "Baryon Stopping and Quark-Gluon Plasma Production at RHIC and LHC". For next ~1.5 years he was involved in oil reservoir engineering in "Petroleum Technologies". In the beginning of 2010, he became a Researcher in Institute of Biochemical Physics of Russian Academy of Science. There, he was mainly occupied by polymers and fuel cells modelling. In late 2010, he has joined the Plasma Applications Laboratory, Nuclear and Energy Engineering Department of Jeju National University, as a Researcher, and in 2012 promoted as a Research Professor. Currently, he is involved in the projects related to laser (isotopes separation, quantum control) and plasma (Thomson scattering, MHD generator) applications. He has published 16 papers in SCI journals, and gave 27 talks in international conferences.

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