SUSTAINABLE ENERGY AND FUELS

Moscow Institute of Physics and Technology (National Research University)

Degree or qualification is awarded: **PhD (Candidate of Science)**

Language of study: **English**
Mode of study: **full-time**
Duration: **4 years**
Availability of free education: **yes**
Price: **375 000 RUB**

Programme webpage at the university website: https://eng.mipt.ru/programs/sustainable-energy-and-fuels/

Programme curator: **Denis Ustyuzhaninov**
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Entry requirements:

- Master's degree / equivalent in a related field
- B2 level of English
- Good track record of publications related to the topic of the intended research
- Strong research proposal 1,500 - 3,500 words

Research supervisor:
Mikhail Vlaskin
PhD, DSc, Head of Laboratory

Supervisor's research interests:

- Metals as carbon-free fuel.
- Microalgae for sustainable environment and biofuel production.
- Thermal decomposition of hydrocarbons into carbon and hydrogen.
- Waste-to-energy, municipal solid waste utilization.
- Natural gas storage and transportation in the form of gas hydrate.
- Functional nano-structured materials based on carbon or metal oxides.

Research highlights:
Highly demanded subjects, international recognition and cooperation, high scientific level, interaction with industrial partners, practice-oriented research, unique experimental facilities and territories.

Supervisor's specific requirements:

- Computer literacy.
- Spoken English.
- Strong motivation.
- Success at the previous place of work / study.
- Leadership experience.

Main publications:

- Shkolnikov E.I., Zhuk A.Z., Vlaskin M.S. Aluminum as energy carrier: Feasibility analysis and current technologies overview // Renewable and Sustainable Energy Reviews. 2011. vol. 15. № 9. p. 4611-4623. https://doi.org/10.1016/j.rser.2011.07.091. Q1. IF=10.556.
- Vlaskin M.S., Shkolnikov E.I., Bersh A.V., Zhuk A.Z., Lisicyn A.V., Sorokovikov A.I., Pankina Y.V. An experimental aluminum-fueled power plant // Journal of Power Sources. 2011. vol. 196. № 20. p. 8828- 8835.

https://doi.org/10.1016/j.jpowsour.2011.06.013. Q1. IF=7.467.

- Shkolnikov E., Vlaskin M., Iljukhin A., Zhuk A., Sheindlin A. 2 W power source based on airhydrogen polymer electrolyte membrane fuel cells and water-aluminum hydrogen micro-generator // Journal of Power Sources. 2008. vol. 185. № 2. p. 967- 972. https://doi.org/10.1016/j.jpowsour.2008.09.062. Q1. IF=7.467.
- Arora N., Jaiswal K.K., Kumar V., Vlaskin M.S., Nanda M., Pruthi V., Chauhan P.K. Small-scale phyco-mitigation of raw urban wastewater integrated with biodiesel production and its utilization for aquaculture // Bioresource Technology. 2020. vol. 297. p. 122489. https: //doi.org/ 10.1016/j.biortech.2019.122489. Q1. IF=6.669.
- Kostyukevich Y., Zherebker A., Vlaskin M.S., Borisova L., Nikolaev E. Microprobe for the Thermal Analysis of Crude Oil Coupled to Photoionization Fourier Transform Mass Spectrometry // Analytical Chemistry. 2018. vol. 90. № 15. p. 8756-8763. https: //doi.org/10.1021/acs.analchem.8b02043. Q1. IF=6.350.
- Buryakovskaya O.A., Vlaskin M.S., Ryzhkova S.S. Hydrogen production properties of magnesium and magnesium-based materials at low temperatures in reaction with aqueous solutions // Journal of Alloys and Compounds. 2019. vol. 785. p. 136-145. h tt p s : //d o i .o rg / 1 0.1 01 6 / j . j a l l co m . 201 9.01 .0 03 . Q1. IF=4.175.
- Vlaskin M.S., Dudoladov A.O., Buryakovskaya O.A., Ambaryan G.N. Modelling of aluminumfuelled power plant with steam-hydrogen enthalpy utilization // International Journal of Hydrogen Energy. 2018. vol. 43. № 9. p. 4623-4631. https: //doi.org/ 10.1016/j.ijhydene.2018.01.023. Q1. IF=4.084.
- Ambaryan G.N., Vlaskin M.S., Dudoladov A.O., Meshkov E.A., Zhuk A.Z., Shkolnikov E.I. Hydrogen generation by oxidation of coarse aluminum in low content alkali aqueous solution under intensive mixing // International Journal of Hydrogen Energy. 2016. vol. 41. № 39. p. 17216-17224. https: //doi.org/ 10.1016/j.ijhydene.2016.08.005. Q1. IF=4.084.
- Dudoladov A.O., Buryakovskaya O.A., Vlaskin M.S., Zhuk A.Z., Shkolnikov E.I. Generation of hydrogen by aluminium oxidation in aquaeous solutions at low temperatures // International Journal of Hydrogen Energy. 2016. vol. 41. № 4. p. 2230-2237. h tt p s : //d o i.o rg/ 1 0.1 01 6 / j .i j hyd e n e . 201 5 .1 1 .12 2 . Q1. IF=4.084.
- Vlaskin M.S., Shkolnikov E.I., Bersh A.V. Oxidation kinetics of micron-sized aluminum powder in hightemperature boiling water // International Journal of Hydrogen Energy. 2011. vol. 36. № 11. p. 6484- 6495. https://doi.org/10.1016/j.ijhydene.2011.02.131. Q1. IF=4.084.
- Vlaskin M.S., Shkolnikov E.I., Lisicyn A.V., Bersh A.V., Zhuk A.Z. Computational and experimental investigation on thermodynamics of the reactor of aluminum oxidation in saturated wet steam // International Journal of Hydrogen Energy. 2010. vol. 35. № 5. p. 1888-1894. https://doi.org/10.1016/j.ijhydene.2009.12.061. Q1. IF=4.084.
- Kumar V., Kumar S., Chauhan P.K., Verma M., Bahuguna V., Joshi H.C., Ahmad W., Negi P., Sharma N., Ramola B., Rautela I., Nanda M., Vlaskin M.S. Low-temperature catalyst based Hydrothermal liquefaction of harmful Macroalgal blooms, and aqueous phase nutrient recycling by microalgae // Scientific Reports. 2019. vol. 9. № 1. p. 11384. https://doi.org/10.1038/s41598-019-47664-w. Q1. IF=4.011.
- Shkolnikov E.I., Shaitura N.S., Vlaskin M.S. Structural properties of boehmite produced by hydrothermal oxidation of aluminum // Journal of Supercritical Fluids. 2013. vol. 73. p. 10-17. https://doi.org/10.1016/j.supflu.2012.10.011. Q1. IF=3.481.
- Kostyukevich Y.I., Vlaskin M.S., Zherebker A., Grigorenko A.V., Borisova L., Nikolaev E.N. High resolution mass spectrometry study of the biooil samples produced by thermal liquefaction of microalgae in different solvents // Journal of the American Society for Mass Spectrometry. 2019. vol. 30 № 4. p. 605-614. https://doi.org/10.1007/s13361-018-02128-9. Q1. IF=3.202.

Specializations within this programme