



Панкин Илья Андреевич

Должность: Заведующий международной лабораторией новых образовательных технологий

Дата рождения: 16.06.1992 г., г.Баку, Азербайджан

Руководитель программы магистратуры Nanoscale structure of materials (реализуется на английском языке); классификатор (03.04.02, Физика)

Образование и ученые степени:

- 2010 – 2014 г.г.: бакалавриат по специальности «Физика». Южный федеральный университет (диплом с отличием).
- 2014 – 2016 г.г.: магистратура по специальности «Физика». Южный федеральный университет (диплом с отличием).
- 2016 – 2019 г.г.: аспирантура в университете Турина на кафедре физической химии. Присвоена степень PhD по направлению «Химия и науки о материалах».
- 2016 – 2020 г.г.: аспирантура физического факультета Южного федерального университета. Присвоена степень к. ф.-м.н.
- 2023 – н.в.: докторатура Южного федерального университета.

Направления исследований (ключевые слова):

гетерогенный катализ, пористые функциональные материалы, наночастицы для биомедицинских применений, спектроскопия рентгеновского поглощения, рентгеновская эмиссионная спектроскопия, квантово-химические расчёты.

Исследовательская активность:

Основное направление – исследование катализаторов на основе цеолитов, допированных атомами переходных металлов для селективного каталитического восстановления вредоносных оксидов азота и прямой конверсии метан-метанол. Результаты исследований по данному направлению были опубликованы в ведущих периодических научных изданиях, таких как Journal of American Chemical Society (2017 г., Impact-Factor: 14.357) и Chemical Science (2017 г., Impact-Factor: 9.063), Catalysis

Today (2020 г. Impact-Factor 5.825), Catalysis Science & Technology (2021 г. Impact Factor: 5.721).

Помимо вышеуказанных исследований, ведет работу и по другим исследовательским направлениям, по результатам которой были опубликованы работы в журналах: Journal of Alloys and Compounds (2017 г, Impact-Factor: 3.799), Journal of Solid State Chemistry (2018 г., Impact-Factor: 2.229), Journal of Mesoporous and Microporous Materials (2020 г., impact factor = 4.551).

Принимает активное участие в международных конференциях и школах, проводимых как на территории РФ, так и в дальнем зарубежье. По результатам исследований, было представлено 8 устных докладов на иностранном языке. Неоднократно был отмечен дипломами за лучший устный доклад (5 наград) на конференциях всероссийского масштаба. Также был удостоен награды за лучший постерный доклад на международной школе по применению синхротронного и нейтронного излучения в материаловедении HERCULES (Гренобль, Франция 2018 г.)

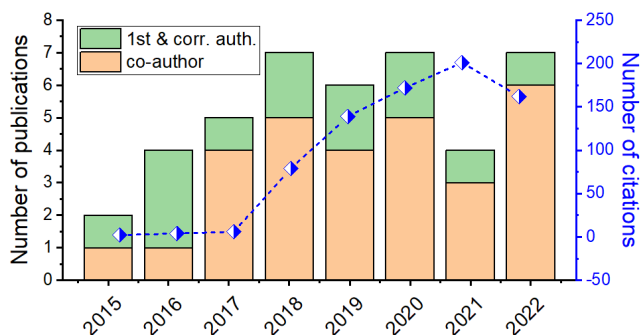
Область научных интересов:

- Гетерогенный катализ, single-site катализаторы, металл-обменные цеолиты в катализе, пористые функциональные материалы, металлические наночастицы для биомедицинских применений.

Методы:

- Рентгеновская спектроскопия поглощения, рентгеновская эмиссионная спектроскопия, квантово-химическое моделирование, моделирование спектроскопических свойств материалов.

Научные публикации в реферируемых журналах:



43 публикации в WoS Core Collection
784 (908) цитирования в Scopus (Google Scholar)
12 (11) *h*-index in Scopus (Google Scholar)

10 наиболее цитируемых публикаций:

1. D. K. Pappas, E. Borfecchia, M. Dyballa, **I. A. Pankin**, K.A. Lomachenko, A. Martini, M. Signorile, S. Teketel, B. Arstad, G. Berlier, C. Lamberti, S. Bordiga, U. Olsbye, K.P. Lillerud, S. Svelle, and P. Beato "Methane to Methanol: Structure–Activity Relationships for Cu-CHA" Journal of the American Chemical Society 2017 139 pp. 14961-14975
2. A. Martini, E. Borfecchia, K. A. Lomachenko, **I. A. Pankin**, C. Negri, G. Berlier, P. Beato, H. Falsig, S. Bordiga, C. Lamberti "Composition-driven Cu-speciation and

reducibility in Cu-CHA zeolite catalysts: a multivariate XAS/FTIR approach to complexity" *Chemical Science* **2017** 8

3. Guda, A. A.; Guda, S. A.; Lomachenko, K. A.; Soldatov, M. A.; **Pankin, I. A.**; Soldatov, A. V.; Braglia, L.; Bugaev, A. L.; Martini, A.; Signorile, M.; Groppo, E.; Piovano, A.; Borfecchia, E.; Lamberti, C. "Quantitative structural determination of active sites from in situ and operando XANES spectra: From standard ab initio simulations to chemometric and machine learning approaches" *Catalysis Today* **2019** pp. 336 pp. 3-21
4. **I.A. Pankin**, A. Martini, K.A. Lomachenko, A.V. Soldatov, S. Bordiga, E. Borfecchi "Identifying Cu-oxo species in Cu-zeolites by XAS: a theoretical survey by DFT-assisted XANES simulation and EXAFS wavelet transform" *Catalysis Today* **2020** 345 pp. 125-135
5. M A Soldatov, A. Martini, A. L Bugaev, **I.A. Pankin**, P. V. Medvedev, A. A. Guda, A. M. Aboaraia, Y. S. Podkovyrina, A. P. Budnik, A.V. Soldatov, C. Lamberti "The insights from X-ray absorption spectroscopy into the local atomic structure and chemical bonding of Metal–organic frameworks" *Polyhedron* **2018** 155 pp. 232-253
6. V.V. Butova, **I.A. Pankin**, O.A. Burachevskaya, K.S. Vetlitsyna-Novikova, A.V. Soldatov, "New fast synthesis of MOF-801 for water and hydrogen storage: Modulator effect and recycling options", *Inorganica Chimica Acta*, **2021**, 514, pp. 120025
7. A. L. Bugaev, A. A. Guda, **I. A. Pankin**, E. Groppo, R. Pellegrini, A. Longo, A. V. Soldatov, C. Lamberti "The role of palladium carbides in the catalytic hydrogenation of ethylene over supported palladium nanoparticles" *Catalysis Today* **2019** 336 pp.40-44
8. V.V. Butova, K.S. Vetlitsyna-Novikova, I.A. Pankin, K.M. Charykov, A.L. Trigub, A.V. Soldatov "Microwave synthesis and phase transition in UiO-66/MIL-140A system", *Microporous and Mesoporous Materials*, **2020** V. 296, 109998
9. M. Mortén, Ł. Mentel, A. Lazzarini, **I.A. Pankin**, C. Lamberti, S. Bordiga, V. Crocella, S. Svelle, K. P. Lillerud, U. Olsbye "A systematic study of isomorphically substituted H-MeAlPO-5 materials for the Methanol to Hydrocarbons (MTH) reaction" *ChemPhysChem* **2018** 19 (4) pp. 484-495
10. K.S. Vetlitsyna-Novikova, V.V. Butova, I.A. Pankin, V.V. Shapovalov, A.V. Soldatov "Zirconium-Based Metal-Organic UiO-66, UiO-66-NDC and MOF-801 Frameworks. Influence of the Linker Effect on the Hydrogen Sorption Efficiency", *Journal of Surface Investigation: X-ray, Synchrotron and Neutron Techniques* **2019**, V. 13, pp. 787-792

Российские гранты:

РНФ – конкурс Проведение инициативных исследований молодыми учеными» Президентской программы исследовательских проектов, реализуемых ведущими учеными, в том числе молодыми учеными. Тема проекта: «Исследование механизмов реакции прямой конверсии метан-метанол на центрах меди в Cu-обменных цеолитах, с помощью DFT моделирования и алгоритмов на основе машинного обучения.»

Годы реализации: **2021 – 2023 гг.**;

Статус: руководитель



Ilia A. Pankin

Personal information:

Family name, Given name: Date of birth: Place of birth:

Pankin, Ilia 16 June 1992

Baku, Azerbaijan

Experiments at synchrotrons:

06/2016 Investigation of local atomic and electronic structures in doped CdSe quantum dots (STM beamline, Kurchatov Synchrotron Radiation Source, Russia).

11/2016 Structure-activity relationship in the deNO_x Cu-CHA catalyst: exploring the effect of composition tuning by HERFD-XANES and XES (ID-26, ESRF, France) 11/2016 Exploring the direct methane to methanol conversion on Cu-zeolites and CuMOFs: a combined XAS/XES study» (BM-26A, ESRF, France).

12/2016 In situ atomic structure and catalytic properties relationship for the palladium catalyst under industrially relevant conditions (BM-26A, ESRF, France).

03/2017 Towards predictive models for zeotype catalyzed reactions: Probing the chemical state and incorporation of heteroatoms (M) in MAPO-5 by combined operando XAS/XRD experiments (BM-31, ESRF, France).

05/2017 Investigation of the oscillatory behavior of hydrogenation reaction on the palladium nanoparticles by time-resolved X-ray absorption spectroscopy (SuperXAS beamline, SLS, Switzerland).

05/2017 Advanced X-ray Spectroscopies of Novel Composites for Theragnostic: Cross-linked Quantum Dots and Magnetic Nanoparticles (ID-26, ESRF, France) 10/2017 Radiation-induced active sites modification of Cu-CHA catalyst (ID-24, ESRF, France).

12/2017 Site/reactants interaction in heterogeneous catalysts highlighted by operando TEY NEXAFS experiments at ambient pressure. Exp I (APE beamline, Elettra synchrotron, Italy).

07/2018 Temperature-dependent NH₃-assisted selective catalytic reduction of NO_x monitored by Operando XAS and XES over Cu-, Fe-, and Cu-Fe-zeolites (BM23, ESRF, France).

12/2018 Site/reactants interaction in heterogeneous catalysts highlighted by operando TEY NEXAFS experiments at ambient pressure. Exp II (APE beamline, Elettra synchrotron, Italy).

06/2019 Investigation of phase formation in UiO-66/MIL-140A systems upon microwave synthesis (STM beamline, Kurchatov Synchrotron Radiation Source, Russia).

08-11/2020 Long-term traineeship at BM-23 beamline of ESRF; participation in the experiment on the SO₂-poisoning of Cu-CHA catalyst monitored by X-ray absorption spectroscopy.

05/2023 Tomography study of the LaF₃-based nanocomposites biodistributions in the tissues of balb/c mice (PT-MT beamline, Kurchatov Synchrotron Radiation Source, Russia)

Oral Contributions at International Conferences:

- 16 International conference XAFS-16 2015 (Karlsruhe, German)
- German-Russian joined school for students and young researchers on Material Science «Travelling seminar» 2015 (Hamburg, Germany)
- International conference «Science of the Future» 2016 (Kazan, Russia)
- EUSpec Winter School on core level spectroscopies (EWinS-2016) 2016 (Ajdovscina, Slovenia)
- International conference «Synchrotron and Free electron laser Radiation: generation and application» (SFR-2016) 2016 (Novosibirsk, Russia)
- International Schools on Smart Nanomaterials IWSN (2014, 2018) (Kaliningrad, Rostov, Russia)
- NIS colloquium «Cu-based zeolites, versatile materials for redox catalysis» 2018 (Turin, Italy)
- Synchrotron Radiation Techniques for Catalysis and Functional Materials 2022 (Novosibirsk, Russia)

Selected publications:

1. 1) A. Yu. Molokova, E. Borfecchia, A. Martini, I. Pankin, C. Aztori, O. Mathon, S. Bordiga, F. When, P. N.R. Vennestrom, G. Breiler, Ton V.W. Janssens, K.A. Lomachenko; "SO₂ Poisoning of Cu-CHA deNO_x Catalyst: The Most Vulnerable Cu Species Identified by X-ray Absorption Spectroscopy", JACS Au 2022, 2, 4, 787–792
2. H.I. Hammoud, L. Wolski, I.A. Pankin, M.A. Banares, M. Daturi, M. El-Roz "In situ and Operando Spectroscopies in Photocatalysis: Powerful Techniques for a Better Understanding of the Performance and the Reaction Mechanism", Topics in Current Chemistry 380, 2023
3. Z. Gadzimagomedova, V. Polyakov, I. Pankin, V. Butova, D. Kirsanova, M. Soldatov, D. Khodakova, A. Goncharova, E. Mukhanova, A. Belanova, A. Maksimov, A. Soldatov "BaGdF₅ Nanophosphors Doped with Different Concentrations of Eu³⁺ for Application in X-ray Photodynamic Therapy", Int. J. Mol. Sci. 2021, 22(23)
4. I.A. Pankin, A. Martini, K.A. Lomachenko, A.V. Soldatov, S. Bordiga, E. Borfecchi "Identifying Cu-oxo species in Cu-zeolites by XAS: a theoretical survey by DFT-assisted XANES simulation and EXAFS wavelet transform" Catalysis Today 2020 345 pp. 125-135

5. V.V. Butova, K.S. Vetlitsyna-Novikova, I.A. Pankin, K.M. Charykov, A.L. Trigub, and A.V. Soldatov "Microwave synthesis and phase transition in UiO-66/MIL-140A system" *Microporous & Mesoporous Materials* 2020 296 109998
6. I.A. Pankin, E. Borfecchi, A. Martini, K.A. Lomachenko, C. Lamberti, A.V. Soldatov "DFT- assisted XANES simulations to discriminate different monomeric CuII species in CHA catalysts" *Radiation Physics and Chemistry* 2019 108510
7. A. L. Bugaev, A. A. Guda, I. A. Pankin, E. Groppo, R. Pellegrini, A. Longo, A. V. Soldatov, C. Lamberti "The role of palladium carbides in the catalytic hydrogenation of ethylene over supported palladium nanoparticles" *Catalysis Today* 2019 336 pp.40-44
8. Guda, A. A.; Guda, S. A.; Lomachenko, K. A.; Soldatov, M. A.; Pankin, I. A.; Soldatov, A. V.; Braglia, L.; Bugaev, A. L.; Martini, A.; Signorile, M.; Groppo, E.; Piovano, A.; Borfecchia, E.; Lamberti, C. "Quantitative structural determination of active sites from in situ and operando XANES spectra: From standard ab initio simulations to chemometric and machine learning approaches" *Catalysis Today* 2019 pp. 336 pp. 3-21
9. Guda, A. A.; Guda, S. A.; Lomachenko, K. A.; Soldatov, M. A.; Pankin, I. A.; Soldatov, A. V.; Braglia, L.; Bugaev, A. L.; Martini, A.; Signorile, M.; Groppo, E.; Piovano, A.; Borfecchia, E.; Lamberti, C. "Quantitative structural determination of active sites from in situ and operando XANES spectra: From standard ab initio simulations to chemometric and machine learning approaches" *Catalysis Today* 2019 pp. 336 pp. 3-21
10. M A Soldatov, A. Martini, A. L Bugaev, I.A. Pankin, P. V. Medvedev, A. A. Guda, A. M. Aboaraia, Y. S. Podkovyrina, A. P. Budnik, A.V. Soldatov, C. Lamberti "The insights from X- ray absorption spectroscopy into the local atomic structure and chemical bonding of Metal– organic frameworks" *Polyhedron* 2018 155 pp. 232-253
11. I.A. Pankin, A.A. Guda, N.A. Tumanov, Ya. Filinchuk, K.A. Lomachenko, A.L. Bugaev, S.A. Guda, V.V. Shapovalov, C. Lamberti, A.V. Soldatov "Experimental and theoretical study of hydrogen desorption process from Mn(BH4)2" *Journal of Alloys and Compounds* 2018 pp. 735 277-284 DOI: 10.1016/j.jallcom.2017.11.062
12. M. Mortén, Ł. Mentel, A. Lazzarini, I.A. Pankin, C. Lamberti, S. Bordiga, V. Crocella, S. Svelle, K. P. Lillerud, U. Olsbye "A systematic study of isomorphically substituted H-MeAlPO-5 materials for the Methanol to Hydrocarbons (MTH) reaction" *ChemPhysChem* 2018 19 (4) pp. 484-495
13. D. K. Pappas, E. Borfecchia, M. Dyballa, I. A. Pankin, K.A. Lomachenko, A. Martini, M. Signorile, S. Teketel, B. Arstad, G. Berlier, C. Lamberti, S. Bordiga, U. Olsbye, K.P. Lillerud, S. Svelle, and P. Beato "Methane to Methanol: Structure–Activity Relationships for Cu-CHA" *Journal of the American Chemical Society* 2017 139 pp. 14961-14975
14. A. Martini, E. Borfecchia, K. A. Lomachenko, I. A. Pankin, C. Negri, G. Berlier, P. Beato, H. Falsig, S. Bordiga, C. Lamberti "Composition-driven Cu-speciation and reducibility in Cu-CHA zeolite catalysts: a multivariate XAS/FTIR approach to complexity" *Chemical Science* 2017 8

Fellowships and Awards:

- Russian Science Foundation grant for young researcher's projects (2021-2023)

- Russian Government sponsorship program for scientific traineeship abroad (2019-2020) o International school for young researchers IWSN-2018, award for best oral report 2018 (Rostov-on-Don, Russia)
- HERCULES (Higher European Research Course For Users of Large Experimental Systems), Best poster award 2018 (Grenoble, France)
- Haldor Tospoe PhD fellowship (2017-2019)
- Russian Government scholarship (2018)
- 2nd Russian national conference «Science of the Future», Best oral report on the section “New materials and technological processes”, 2016 (Kazan, Russia)
- International conference for PhD and young researchers «Lomonosov 2016», Bestoral report on the section “Condensed matter physics” 2016 (Moscow, Russia)
- Russian national conference for students and young researchers in Physics «VNKSF-22», award for best oral presentation 2016 (Taganrog, Russia)
- XXIII Russian national Kurchatov’s conference, award for best oral report 2015 (Moscow, Russia)
- National school on modern characterization techniques for nanomaterials «Synchrotron based techniques and neutron experiments» (СИН-НАНО), award for best oral report 2015 (Moscow, Russia)
- Russian national conference for students and young researchers in Physics «VNKSF-21», award for best oral presentation 2015 (Omsk, Russia)
- "Philip Morris" Corp. Scholarship holder, 2014
- "Center-Invest" bank scholarship program for student and young researchers for the achievements in education and research activity (2014, 2015, 2016)
- Rostov region government scholarship for students and young researchers (2014, 2016) o International school for young researchers IWSN-2014, award for best poster report 2014 (Kaliningrad, Russia)