

CURRICULUM VITAE

Dr. Aleksandr Shkatulov

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WORK EXPERIENCE

02/2024 - present	Senior researcher at <i>Iberian Centre for Energy Storage Research</i> , Cáceres, Spain
03/2022 – 02/2024	Postdoctoral Fellow (Marie Curie Individual Fellowship) at <i>German Aerospace Center</i> , Institute of Engineering Thermodynamics, Stuttgart, Germany
05/2018 – 03/2022	Postdoctoral researcher at <i>Eindhoven University of Technology</i> , Department of Applied Physics, Eindhoven, Netherlands
09/2015 - 04/2018	Assistant lecturer at <i>Novosibirsk State University</i> , General Chemistry Department, Novosibirsk, Russia
10/2012 - 04/2018	Researcher at <i>Borsov Institute of Catalysis</i> , Novosibirsk, Russia

Research stays

03/2022 – 02/2024	Guest researcher at <i>Delft University of Technology</i> , Inorganic Systems Engineering, Delft, Netherlands
10/2020 - 12/2020	Visiting scientist at <i>Friedrich-Alexander-Universität Erlangen-Nürnberg</i> , Computer Chemistry Center, Erlangen, Germany
02/2017 - 04/2017	Visiting scholar (WRHI) at <i>Tokyo Institute of Technology</i> , Laboratory for Zero-Carbon Energy, Tokyo, Japan

EDUCATION AND TRAINING

10/2012 - 06/2016	Borsov Institute of Catalysis (Russia), PhD in Physical Chemistry, 2016
09/2007 - 06/2012	Novosibirsk State University (Russia), M.Sc. in Chemistry, <i>summa cum laude</i> , GPA 5.0/5.0

RESEARCH EXPERTISE AND TECHNICAL SKILLS

Area of expertise

- Thermochemical energy storage
- Materials for advanced sorptive and thermochemical cycles
- Adsorption and characterization of porous structure
- Atomic scale simulations (DFT, MD) and theoretical characterization of electronic structure

Experimental methods

- Thermal analysis (TGA, DSC, DVS)
- X-ray diffraction analysis
- Texture characterization
- NMR imaging and relaxometry
- Electron microscopy (SEM, HRTEM)

Skills

- Preparation and publishing of papers in scientific journals
- Writing scientific proposals
- Project management skills
- Mentoring master and PhD students

Languages

- English (C1 Advanced Cambridge Certificate), Russian (native), German (basic), Dutch (basic)

PUBLICATIONS

- Papers in refereed journals: 18, 1 book chapter
- Communications to scientific meetings (oral): 19

Reviewer: Advanced Materials, Applied Energy, Energy Conversion and Management, Chemical Engineering Journal, etc.

List of journal papers

- Eberbach, M., Huinink, H., **Shkatulov, A.**, Fischer, H., Adan O.C.G. The effect of nanoconfinement on deliquescence of CuCl_2 is stronger than on hydration (2023) *Cryst. Growth Des.*, 23, 3, 1343–1354.
- Houben, J., **Shkatulov, A.**, Huinink, H., Fischer, H., Adan, O.C.G. Caesium doping accelerates the hydration rate of potassium carbonate in thermal energy storage (2023), *Solar Energy Materials and Solar Cells*, 251, 112116.
- Shkatulov, A.**, Becit, B, Zahn, D. Molecular Dynamics Simulations of Nitrate/MgO Interfaces and Understanding Metastability of Thermochemical Materials (2022), *ACS Omega*, 7, 16371–16379.
- Shkatulov, A.**, Miura, H., Kim, S. T., Zamengo, M., Harada, T., Takasu, H., Kato, Y., Aristov, Y. Thermochemical storage of medium-temperature heat using MgO promoted with eutectic ternary mixture $\text{LiNO}_3\text{-NaNO}_3\text{-KNO}_3$ (2022) *Journal of Energy Storage*, 51, 104409.
- Solovyeva, M., **Shkatulov, A.**, Gordeeva, L., Fedorova, E., Krieger T., Aristov Y. Water vapor adsorption on CAU-10-X: effect of functional groups on adsorption equilibrium and mechanisms (2021), *Langmuir*, 37, 693–702.
- Shkatulov, A.I.**, Joosten, R., Fischer, H., Huinink, H. Core-shell encapsulation of salt hydrates into mesoporous silica shells for thermochemical energy storage (2020) *ACS Appl. Energy Mater*, 3, 7, 6860–6869.
- Shkatulov A. I.**, Gordeeva L.G., Girnuk I.S., Huinink H.P., Aristov Y. Novel adsorption method for moisture and heat recuperation in ventilation: Composites “LiCl/matrix” tailored for cold climate (2020), *Energy*, 117595.
- Shkatulov, A.I.**, Houben, J., Fischer, H., Huinink, H.P. Stabilization of K_2CO_3 in vermiculite for thermochemical energy storage (2020) *Renewable Energy*, 150, pp. 990-1000.
- Kim, S.T., Miura, H., Takasu, H., Kato, Y., **Shkatulov, A.**, Aristov, Y. Adapting the MgO- CO_2 working pair for thermochemical energy storage by doping with salts: Effect of the $(\text{LiK})\text{NO}_3$ content (2019) *Energies*, 12 (11), art. no. 2262.
- Shkatulov, A. I.**, Takasu, H., Kato, Y., Aristov, Y. Thermochemical energy storage by LiNO_3 -doped $\text{Mg}(\text{OH})_2$: Rehydration study (2019) *Journal of Energy Storage*, 22, pp. 302-310.
- Shkatulov, A.I.**, Kim, S.T., Miura, H., Kato, Y., Aristov, Y.I. Adapting the MgO- CO_2 working pair for thermochemical energy storage by doping with salts (2019) *Energy Conversion and Management*, 185, pp. 473-481.
- Bakovets, V.V., Sotnikov, A.V., Agazhanov, A.S., Stankus, S.V., Korotaev, E.V., Pishchur, D.P., **Shkatulov, A.I.** Some features of thermophysical properties of $\gamma\text{-Gd}_2\text{S}_3$ ceramics based on real structure (2018) *Journal of the American Ceramic Society*, 101 (10), pp. 4773-4782.
- Shkatulov, A.I.**, Aristov, Y. Thermochemical Energy Storage using LiNO_3 -Doped $\text{Mg}(\text{OH})_2$: A Dehydration Study (2018) *Energy Technology*, 6 (9), pp. 1844-1851.
- Tokarev, M.M., Gordeeva, L.G., **Shkatulov, A.I.**, Aristov, Y.I. Testing the lab-scale “Heat from Cold” prototype with the “LiCl/silica – methanol” working pair (2018) *Energy Conversion and Management*, 159, pp. 213-220.
- Shkatulov, A.**, Aristov, Y. Calcium hydroxide doped by KNO_3 as a promising candidate for thermochemical storage of solar heat (2017) *RSC Advances*, 7 (68), pp. 42929-42939.
- Shkatulov, A.**, Aristov, Y. Modification of magnesium and calcium hydroxides with salts: An efficient way to advanced materials for storage of middle-temperature heat (2015) *Energy*, 85, pp. 667-676.

17. **Shkatulov, A.**, Krieger, T., Zaikovskii, V., Chesalov, Y., Aristov, Y. Doping magnesium hydroxide with sodium nitrate: A new approach to tune the dehydration reactivity of heat-storage materials (2014) *ACS Applied Materials and Interfaces*, 6 (22), pp. 19966-19977.
18. **Shkatulov, A.**, Ryu, J., Kato, Y., Aristov, Y. Composite material "Mg(OH)₂/vermiculite": A promising new candidate for storage of middle temperature heat (2012) *Energy*, 44 (1), pp. 1028-1034.

Book chapters:

1. Gordeeva L.G., **Shkatulov A.I.**, Aristov Yu. I. Closed sorption systems in: Encyclopedia of Energy Storage, Volume 1, 2022, Pages 542-558, Cabeza L. F. ed., Elsevier.

List of oral communications to scientific meetings:

1. **Shkatulov A. I.**, Linder M. Screening hydroxides for thermochemical energy storage at medium temperatures, International Renewable Energy Storage and Systems Conference (IRES 2023), 28 – 30 November 2023, Aachen, Germany.
2. **Shkatulov A. I.**, Tranca I., Genc E., Linder M. Exploring structure-property relationships for hydration and carbonation of metal oxides for thermochemical energy storage, 1st conference on artificial intelligence in materials Science and Engineering, 22-23 November 2023, Saarbrücken, Germany.
3. **Shkatulov, A.I.**, Huinink H.P. Salt hydrates for low- and ultralow-temperature heat transformation, International Symposium on Innovative Materials and Processes in Energy Systems, Barcelona, 25-27 October 2022.
4. **Shkatulov, A.I.**, Genç, A.E., Tranca I.C. Exploring structure-property relationships for hydration and carbonation of metal oxides for thermochemical energy storage, E-MRS Fall meeting 2022, Wawrsaw, 19-21 September 2022.
5. **Shkatulov A.I.**, Tranca I., Huinink H., Machine learning aided screening of new salt hydrates for thermochemical energy storage, NWO Chains conference, 6-8 December 2021.
6. **Shkatulov A. I.**, Huinink, H. Core-shell composites for thermochemical energy storage with high storage density, Materials Science and Engineering Congress (MSE 2020), 22-25 September 2020.
7. **Shkatulov A. I.**, Solovyeva M. V., Gordeeva L.G., Aristov Y.I. Water vapor adsorption on CAU-10-X: effect of functional groups on adsorption equilibrium and mechanisms, CMD2020GEFES, 31 August – 04 September 2020.
8. **Shkatulov, A.I.**, Huinink, H. Core-shell composites LiCl@SiO₂ for thermochemical energy storage with high storage density, International Renewable Energy Storage Conference (IRES 2020), May 2020, Dusseldorf, Germany.
9. **Shkatulov, A.I.**, Huinink, H., Stabilization of K₂CO₃ for thermochemical energy storage, 5th International Workshop on Heat-Mass Transfer Advances for energy conservation and pollution control, 13-16 August 2019, Novosibirsk, Russia.
10. **Shkatulov, A.I.**, Houben, J., Huinink, H. Stabilization of K₂CO₃ in expanded vermiculite for thermochemical energy storage, Eurotherm №112: Advances in Thermal Energy Storage, 15-17 May 2019, Lleida, Spain.
11. **Shkatulov, A.I.**, Kim, S.T., Kato, Y., Aristov, Y.I. Adapting the MgO-CO₂ working pair for thermochemical energy storage by doping with salts, Heat Powered Cycles Conference (HPC 2018), 16-19 September 2018, Bayreuth, Germany.
12. **Shkatulov, A.I.**, Kardash, T. Aristov, Y.I., Layered double hydroxide Mg-Al-OH for thermochemical heat storage, International Sorption Heat Pump Conference (ISHPC 2017), 7-10 August 2017, Tokyo, Japan.
13. **Shkatulov, A.I.**, Aristov, Y.I., Role of surface energy in dehydration of magnesium and calcium hydroxides, XXI International Conference on Chemical Thermodynamics in Russia (RCCT-2017), 26-30 June, Novosibirsk, Russia.
14. **Shkatulov, A.I.**, Aristov, Y.I., Thermochemical heat storage by magnesium and calcium hydroxides doped by inorganic salts, Materials Science and Engineering congress (MSE 2016), 27-29 September 2016, Darmstadt, Germany.

15. **Shkatulov, A.I.**, Aristov, Y.I., Layered hydroxides as promising candidates for storage of middle-temperature heat, International Symposium on Innovative Materials and Processes for Energy Systems (IMPRES 2016), 4-6 September 2016, Taormina, Italy.
16. **Shkatulov, A.I.**, Aristov, Y.I. Effect of salt additives on decomposition of magnesium and calcium hydroxides, Hot topics of solid-state chemistry (HTSSC-15), 26-28 October 2015, Novosibirsk, Russia.
17. **Shkatulov, A.I.**, Aristov, Y.I., Thermochemical storage of middle temperature heat by magnesium and calcium hydroxides doped by salts: a chemical approach, Sorption Friends, 14-16 September 2015, Milazzo, Italy.
18. **Shkatulov, A.I.**, Aristov, Y.I., Salt-doped $\text{Mg}(\text{OH})_2$ and $\text{Ca}(\text{OH})_2$ as candidates for middle-temperature heat storage, Eurotherm №99: Advances in Thermal Energy Storage, 28-30 May 2014, Lleida, Spain.
19. **Shkatulov, A.I.**, Aristov, Y.I. Salt-modified calcium hydroxide: a new candidate for middle-temperature heat storage, International Symposium on Innovative Materials and Processes for Energy Systems (IMPRES 2013), 4-6 September 2013, Fukuoka, Japan.
20. **Shkatulov, A.I.**, Ryu, J, Kato, Y., Aristov, Y. New composite “ $\text{Mg}(\text{OH})_2$ -vermiculite”: a promising candidate for storage of middle-temperature heat, Heat Powered Cycles, 10-12 September 2012, Alkmaar, the Netherlands.