

I address in my research some of the most urgent environmental questions: **water quality** and **development of sustainable materials**. My methodology revolves around a specific group of synthetic mineral products, **alkali-activated materials and geopolymers**, which offer a wide range of applications from concrete binder to high-tech nanomaterials. I have made several pioneering research openings in these areas, especially related to **water treatment**. My research has **high societal relevance** as reflected by the level of (inter)national collaboration.

1. Personal details and the date of the CV

Surname:	Luukkonen
First names:	Tero Markus
ORCID iD:	https://orcid.org/0000-0002-1124-775X
Date of CV:	22.9.2022

2. Degrees

1.10.2020, Title of Docent, discipline: Environmental Applications of Alkali-activated Materials, University of Oulu, Finland.

1.3.2016, Doctor of Science, Physical Chemistry, University of Oulu, Finland. Contact information: Faculty of Science, telephone +358 294 480 000, email: study@oulu.fi

21.6.2010, Master of Science, Physical Chemistry, University of Oulu, Finland.

18.6.2009, Bachelor of Science, Chemistry, University of Oulu, Finland.

3. Language skills

Finnish: Native, **English:** Proficient in understanding, speaking, and writing, **Swedish:** Basic level understanding, speaking, and writing skills.

4. Current employment

I work as an **Assistant Professor** (since 1.8.2020, stage of the academic research career: II) at Fibre and Particle Engineering Research Unit, Univ. of Oulu. My research focuses on advanced preparation and modification geopolymers and their applications in environmental technology.

5. Previous work experience

I have worked as a **Postdoctoral Researcher** (1.3.2017–31.7.2020) at Fibre and Particle Engineering Research Unit, Univ. of Oulu. I have made **research visits to Eawag, Switzerland** (1.9.2019–17.3.2020) and **Univ. of Padova, Italy** (1.11.2018–31.3.2019). My research focused on water treatment applications of geopolymers and low-CO₂ binders for construction. Before starting a postdoc period, I worked (50% position) as an **R&D Manager** (1.3.2016–28.2.2017) at Aquaminerals Finland Oy, a company providing water and wastewater treatment systems by mineral-based adsorbents. I also worked as a **Project Researcher** (1.11.2013–28.2.2017, 50% position during 1.1.2015–28.2.2017) at Kajaani University of Applied Sciences, where I gained my first experience related to geopolymer materials and their use in water treatment. During my Ph.D. studies, I worked as a **Doctoral Researcher** (1.6.2015–30.11.2015, 50% position) at Research Unit of Applied Chemistry, Univ. of Oulu and received a **grant from Maa- ja vesiteknikan tuki ry** (1.1.2015–31.12.2016). My doctoral thesis focused on new adsorption and oxidation-based materials and processes. Before that I have worked as a **Researcher / Research Manager** (3.10.2010–16.9.2013) at PAC-Solution Oy and **Researcher** (1.6.2010–1.10.2010) at JP-Analysis. Those companies focused on peracetic acid-based wastewater treatment and ultrapure water treatment at a recovery boiler plant, respectively.

6. Research funding and grants

1. **Kaivosten passiivisen vedenkäsittelyn uudet materiaalit ja arvoaineiden talteenotto (KaiPa)**, 15.8.2022–15.7.2024, consortium project, source of funding: NextGenerationEU, own group budget: 139 909 €, total budget: 361 752 €, role in the preparation: writing of the proposal and building the consortium. Principal Investigator (PI): Tero Luukkonen
2. **Integration of underutilized ashes into material cycles by industry-urban symbiosis (AshCycle)**, 1.6.2022–31.5.2026, consortium project, source of funding: Horizon Europe, own group budget: 934 802 €, total budget: 10 311 013 €, role in the preparation: writing of the proposal. PI: Tero Luukkonen.
3. **Circular Economy of water in industrial processes (CEIWA)**, 1.4.2021–31.03.2023, consortium project, source of funding: Business Finland, own group budget: 110 000 €, total budget: 6 320 000 €, role in the preparation: writing of 1 WP to the proposal. PI: Mika Ruusunen.
4. **Resource-wise nutrient recovery from industrial wastewaters (TYPKI)**, 1.2.2021–31.11.2023, consortium project, source of funding: Business Finland, own group budget: 110 500 €, total budget: 1 030 000 €, role in the preparation: writing of one work package to the proposal. PI: Tero Luukkonen.
5. **Mineral wool waste back to loop with advanced pre-treatment, and alkali activation (WOOL2LOOP)**, 1.6.2019–31.12.2022, consortium project, source of funding: Horizon2020, own group budget: 812 719 €, total budget: 5 294 938 €, role in the preparation: writing of the proposal. PI: Mirja Illikainen.
6. **Functional geopolymers and peracids in disinfection and advanced oxidation of water and wastewater**, 1.9.2018–31.8.2021, postdoctoral grant, source of funding: Academy of Finland, total budget: 368 026 €, role in the preparation: writing of the proposal. PI: Tero Luukkonen.
7. **AquaPilot**, 1.8.2016–31.8.2018, company project, source of funding: the Finnish Funding Agency for Technology and Innovation (Tekes), total budget: 163 200 €, role in the preparation: writing of the proposal. PI: Matias Nurmi (Aquamaterials Finland Ltd).
8. **Kaivosvesiä vastaanottavien vesistöjen hallinta ja kunnostaminen (KaiHali)**, 1.8.2015–28.2.2018, consortium project, source of funding: European Regional Development Fund (ERDF), total budget: 746 514 €, role in the preparation: planning of 1 WP. PI: Jari Kähkönen.
9. **New geopolymer based water treatment materials (GeoSorbents)**, 1.1.2015–31.1.2016, consortium project, source of funding: Tekes, total budget: 392 460 €, role in the preparation: wrote major part of the proposal. PI: Jari Kähkönen.
10. **Orgaanisten peroksidien vertailu vedenkäsittelyn desinfiointi- ja hapetussovelluksissa**, 1.1.2015–31.1.2016, personal grant, source of funding: Maa- ja vesiteknikan tuki ry, total budget: 40 000 €, role in the preparation: wrote the proposal. PI: Tero Luukkonen.

7. Research output

Total number of publications: 69, h-index: 25, total number of citations: 2471 (Source: Scopus).
The five most cited publications:

1. **Luukkonen, T.**, Abdollahnejad, Z., Yliniemi, J., Kinnunen, P., Illikainen, M. (2018) One-part alkali-activated materials: A review, *Cement and Concrete Research*, 103: 21–34. <https://doi.org/10.1016/j.cemconres.2017.10.001>
2. **Luukkonen, T.**, Pehkonen, S.O. (2017) Peracids in water treatment: A critical review, *Critical Reviews in Environmental Science & Technology*, 47: 1–39. <https://doi.org/10.1080/10643389.2016.1272343>
3. **Luukkonen, T.**, Abdollahnejad, Z., Yliniemi, J., Kinnunen, P., Illikainen, M. (2018) Comparison of alkali and silica sources in one-part alkali-activated blast furnace slag mortar, *Journal of Cleaner Production*, 187: 171–179. <https://doi.org/10.1016/j.jclepro.2018.03.202>

4. **Luukkonen, T.**, Sarkkinen, M., Kemppainen, K., Rämö, J., Lassi, U. (2016) Metakaolin geopolymer characterization and application for ammonium removal from model solutions and landfill leachate, *Applied Clay Science*, 119: 2016, 266–276. <https://doi.org/10.1016/j.clay.2015.10.027>
5. **Luukkonen, T.**, Runtti, H., Niskanen, M., Tolonen, E-T., Sarkkinen, M., Kemppainen, K., Rämö, J., Lassi, U. (2016) Simultaneous removal of Ni(II), As(III) and Sb(III) from spiked mine effluent with metakaolin and blast-furnace-slag geopolymers, *Journal of Environmental Management*, 166: 579–588. <https://doi.org/10.1016/j.jenvman.2015.11.007>

Patents: **Luukkonen, T.**, Kekko, T., Vänskä, P. (2014) Menetelmä humuksen poistamiseksi raakavedestä [Method for removal of humic substances from water], Finnish Patent No. FI124493.

Number of patent applications or invention disclosures under evaluation: 3.

11. Research supervision and leadership experience

Main supervisor in 4 and co-supervisor in 2 on-going Ph.D. theses. Number of completed supervised theses: Ph.D. 1, M.Sc. 6 and B.Sc. 7.

Number of projects in which PI: 5. Line manager at University of Oulu, number of subordinates: 5.

12. Teaching merits

Teaching responsibility ~80 h/year (5% of working hours), typically in the following courses: 477129S Inorganic materials in circular economy (5 ECTS); 477122A Bulk Solids Handling (5 ECTS); and 477121A Particle Technology (5 ECTS). **Pedagogical training:** Doctoral Supervision Training for Supervisors (2 ECTS), University of Oulu, Date: 17.6.2021; Introduction to University Pedagogy (5 ECTS), University of Oulu, Date: 31.12.2020.

13. Awards and honours

Science of the Total Environment award (The 2nd International Conference on Green Technologies for Sustainable Water, 2019); Finnish Recovery Boiler Committee, thesis award, 2010.

14. Other academic merits

Editor for book *Alkali-activated Materials in Environmental Technology Applications*, Woodhead Publishing (2022); **Guest editor** for Int. J. Environ. Res. Public Health, special issue “Organic Peracids in Novel Environmental and Public Health Applications” (2021).

Peer reviewer for several top-level journals, e.g., Environmental Science & Technology; Water Research; Journal of Hazardous Materials; Waste Management; Cement and Concrete Research; and Journal of Cleaner Production. **Number of peer-reviews** in 2022: 37, 2021: 31, and 2020: 44.

Funding application reviewer: Austrian Science Fund, FWF (2022), Dutch Research Council, NWO (2021), Czech Science Foundation, GACR (2021, 2022), National Research and Development Agency of Chile (2020).

15. Scientific and societal impact

Presence in media related to research: radio interviews in 2022 and 2019; wide national media attention in Finland about the development of record-high-strength dry-mix alkali activated concrete in 2019 (> 10 news pieces); interview related to the mine water treatment by adsorption in 2016.