



Installationskrift för professor Leena Hupa

Den 2 december 2022 kl. 18
Solennitetssalen, Akademihuset
Rothoviusgatan 1, Åbo



Med anledning av att professor i oorganisk kemi, teknologie doktor **Leena Hupa** tillträtt sitt ämbete, ordnas en offentlig föreläsning.

Vetenskapens gynnare, idkare och vänner, inbjudes till föreläsningen fredagen den 2 december 2022 kl. 18.

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Åbo 2022

Med vördsam hälsning,

Mikael Lindfelt

Rektor för Åbo Akademi

Oorganisk kemi vid Åbo Akademi kombinerades inledningsvis med analytisk kemi. År 1943 kallades TkD **Anders Ringbom** till en extra ordinarie professur i kemi, företrädesvis analytisk kemi och oorganisk kemi, som 1952 blev en ordinarie professur i samma ämne vid kemisk-tekniska fakulteten. När han avgick med pension ombildades tjänsten och från 1970 sköttes professuren i oorganisk kemi av TkD **Kaj Karlsson**.

Forskningen i oorganisk kemi har ända från början inriktats på materialkemi och högtemperaturkemi. Inom materialkemin har forskningen långt koncentrerats på glas och högtemperaturkemin har sedan mitten av 1970-talet inriktats på förbränningsprocesser.

Professor Karlsson avgick med pension 1998. Samma år kallades docent, TkD **Mikko Hupa** till professuren i oorganisk kemi efter att ha skött en tidsbunden professur i kemisk förbränningsteknik. Professuren i oorganisk kemi ledigförklarades 2015 då professor Hupa hade utnämnts till rektor för Åbo Akademi 2015–2018. Till hans vikarie anställdes docent, TkD **Leena Hupa**. Fakulteten för naturvetenskaper och teknik inledde i december 2019 en rekryteringsprocess inför pensioneringen av professor Mikko Hupa efter att styrelsen 19.11.2019 beviljat fakulteten tillstånd att rekrytera en professor i oorganisk kemi. I beredningsgruppen ingick dekan **Patrik Henelius**, professor **Henrik Saxén**, professor **Maarit Karppinen** (Aalto-universitetet) och akademilektor **Maristiina Nurmi**. Rektor godkände redogörelsen 11.2.2020 och befattningen lediganslogs.

Till sakkunniga utsågs professor **Peter Hayes** vid School of Chemical Engineering, University of Queensland, professor **Alicia Duran** vid Instituto de Cerámica y Vidrio, Spanish National Research Council (CSIC) och professor **Kim Dam-Johansen** vid Institut for Kemiteknik, Danmarks Tekniske Universitet.

Med stöd av beredningsgruppens förslag och de sakkunnigas utlåtanden beslutade fakultetsrådet vid fakulteten för naturvetenskaper och teknik vid sitt möte den 23.9.2020 att göra en framställning till rektor att docent, TkD Leena Hupa anställs som professor i oorganisk kemi. Rektor verkställde anställningen 6.10.2020.

Professor Leena Hupa håller fredagen 2 december 2022 kl. 18.00 i Solennitetssalen, Akademihuset, en offentlig föreläsning i ämnet: *"Oorganiska material och höga temperaturer."*

Åbo i november 2022

Patrik Henelius, dekan

Installationskrift för professor Leena Hupa

Leena Hupa är född i Nystad den 11 juni 1957. Hon tog studenten vid Uudenkaupungin yhteislyseo, Nystad, 1976. År 1981 avlade hon diplomingenjörsexamen vid kemisk-tekniska fakulteten, Åbo Akademi. Därpå följde teknologie licentiat-examen 1985 och doktorsexamen 1987. Avhandlingen i oorganisk kemi hade titeln "*Natural aluminous raw materials in glass melting*".

Efter doktorandstudierna fortsatte hon att forska vid laboratoriet för oorganisk kemi under åren 1982–1983 och sedan som forskningsingenjör vid Lohja Corporation (Minerals) 1984–1987. I augusti 1987 återvände hon till laboratoriet för oorganisk kemi som överassistent och fortsatte sedan som vikarierande akademilektor 1991–1995, akademilektor 1991–2014 och som forskningsledare och ämnesansvarig till augusti 2015. Från september 2015 har hon arbetat som professor i oorganisk kemi, först som vikarie och från oktober 2020 som ordinarie professor. Hon har fungerat som ämnesansvarig i oorganisk kemi och från augusti 2019 som laboratorieföreståndare för laboratoriet för molekylärvetenskap och -teknik inom ämnesklustret Kemi och kemiteknik.

Leena Hupa har i huvudsak forskat i relationer mellan den kemiska sammansättningen och de kemiska och fysikaliska egenskaperna i keramik och glas inklusive biokeramik. Forskningsområdet har senare utvidgats till högtemperaturanvändning av biomassabaserade bränslen och till användning av sidoströmmar och avfall från industriprocesser från en kretsloppsekonomisk synvinkel. Hupa har publicerat 234 referentgranskade artiklar, artiklar i konferenspublikationer och bokkapitel samt 49 övriga vetenskapliga artiklar. Hon har även tre patent och innovationsanmälningar.

Professor Hupa har hittills handlett 36 diplomarbeten, varav en pågående, och 16 doktorander varav 7 är pågående. Hon har fungerat som opponent, förgranskare, granskare och sakkunnig vid 6 disputationer, för 13 doktorsavhandlingar, 4 licentiatavhandlingar och vid 12 professors- eller biträdande professorstillsättningar samt är eller har varit medlem i 14 styrelser eller styrgrupper.



Leena Hupa

Om sin levnad och tidigare verksamhet har professor Leena Hupa ytterligare lämnat följande uppgifter:

Personalia

Född, 11.6.1957, i Nystad (f. Hatakka)
Föräldrar: Arvo och Anja (f. Liippala) Hatakka
Make: Mikko Hupa
Barn: Elisa

Studier och examina

1987: Teknologie doktor, Åbo Akademi
1985: Teknologie licentiat, Åbo Akademi
1981: Diplomingenjör, Åbo Akademi

Docenturer

2006: Docent i funktionella silikatmaterial

Anställningar och affilieringar

Professor i oorganisk kemi, Åbo Akademi, 1.9.2015–
Forskningsledare och ämnesansvarig, oorganisk kemi, ÅA, januari 2015– augusti 2015
Akademilektor i oorganisk kemi, Åbo Akademi augusti 1991– december 2014
Tf. akademilektor i oorganisk kemi, Åbo Akademi juli 1991– januari 1995
Överassistent i oorganisk kemi Åbo Akademi, augusti 1987– december 1994
Forskningsingenjör, Lohja Corporation (Minerals), Finland januari 1984– juli 1987
Forskningsassistent, oorganisk kemi, Åbo Akademi januari 1982– december 1983

Vetenskapliga sakkunniguppdrag

Opponent vid 6 doktorsdisputationer, granskare av 13 doktorsavhandlingar och 4 licentiatavhandlingar, medlem i 7 bedömningsnämnder, förutom ÅA. (i Finland, Sverige, Danmark, Spanien).
Sakkunnig vid utnämning av 13 professorer eller biträdande professorer (Finland, Sverige, Danmark) samt beviljande av 4 docenttitlar (Finland, Sverige, Danmark).
Referentgranskare av 5 finansieringsansökningar (Sverige, Schweiz, Nederländerna).
Medlem av Publikationsforumet (JUFO) Panel 10 (kemiteknik, materialteknik och miljöteknik), 2018–2021.

Akademiska och vetenskapliga förtroendeuppdrag och medlemskap

Council member of the International Commission on Glasses, ICG, 2010–
Medlem av styrgruppen för Smart Chemistry Park, Turku Finland 2015–
President för Kemistklubben, Åbo Akademi, 2019–
Styrelsemedlem, Svenska Tekniska Vetenskapsakademien i Finland, 2022 (Styrelsesuppleant 2019–2022).

Styrelsemedlem, Sigrid Juselius Foundation 2022–. (Styrelsesuppleant 2019–2021).
Vice ordförande för Biomaterial and Medical Device Research Program in the BioCity Turku Research Programs, 2016–2021.
Suppleant i styrgruppen för BioCity Turku Research Programs, 2019–
Styrelsemedlem i Johan Gadolin Process Chemistry Centre, ÅA, 2015–
Medlem i styrgruppen för UPM Kymmene – Åbo Akademi samarbetet, 2019–
Styrelsemedlem i Axels och Stinas Gamylers (ASG), alumniföreningen för alla diplomingenjörer och kemimagistrar från Åbo Akademi, 2019–
Medlem i styrgruppen för Åbo Akademis strategiska profilområde Teknologier för en hållbar framtid (tidigare Molekylär process- och materialteknologi) 2020–
Styrelsemedlem, Finnish Biomaterials Society, 2012–2016.
Styrelsemedlem, Åbo Akademi, 1994–1995.
Medlem i International Commission on Glass Technical Committee TC24 (Coating on glass 2008–2010), TC4 (Glasses for medicine and biotechnology 2008–), TC18 (Properties of glass forming melts 2008–), TC23 (Education 2016–).

Utmärkelser

Medlem av team Heatstock, vinnaren av Helsinki Challenge-tävlingen, 2017.
Ledamot av Svenska tekniska vetenskapsakademien i Finland, 2015–

Pedagogiska aktiviteter

Universitetspedagogik, 10 sp, 2006, ÅA.
Kursansvarig lärare/lektor från 1987: 2 grundkurser, 5 kurser ämnesstudier, 10 kurser fördjupade studier vid ÅA.
Gästföreläsare vid Helsingfors universitet, Aalto universitet, Östra Finlands universitet och vid International Commission on Glass courses.

Handledning och ledarskap

Handledare/bihandlare för 35 diplomarbeten och 9 doktorsavhandlingar samt ett pågående diplomarbete och 7 doktorander.
Laboratorieföreståndare: Laboratoriet för molekylärvetenskap och -teknik, 2019–
Ansvarig ledare av forskningsgruppen i oorganisk kemi, 2015–
Ansvarig ledare för externt finansierade projekt. 2018: 1.1 M€, 2019: 1.2 M€, 2020: 1.2 M€, 2021: 1.2 M€.

Arrangör av internationella konferenser och möten

Co-organizer of Korea-Finland Sustainable and Circular Economy Symposium, Åbo 2022.
Co-organizer of Åbo-Aurum Open Symposium on Inorganic Materials and Recycling, Åbo 2021.
Co-organizer of the Symposium Glass and Water: Degradation of Amorphous Materials Session, annual meeting of the American Ceramic Society, Glass and Optical Materials Division, USA 2020.

Vetenskapliga föredrag 2015- (i urval)

Turku Biomaterials Days – Glass technology across healthcare industry and science, Åbo 2022.

18th Nordic Corrosion Congress, Åbo 2022.

Scandinavian Glass Science Seminars, virtuell, 2022.

Korea-Finland Sustainable and Circular Economy Symposium, virtuell, 2021.

American Ceramic Society, Glass & Optical Materials Division Annual Meeting, 2020.

Kiertotalouden suurivolyymiset mahdollisuudet – sivuvirrat kiertoon kestävästi, CircVol-kiertotalous webinar, 2020.

10 years of Biomaterials in Erlangen Anniversary, Erlangen, Tyskland 2019

European Congress and Exhibition on Advanced Materials and Processes, EUROMAT 2019, Stockholm.

2nd Global Forum on Advanced Materials and Technologies for Sustainable Development and the 4th International Conference on Innovations in Biomaterials, Biomanufacturing and Biotechnologies, Toronto, Kanada 2019.

25th International Congress on Glass 2019, Boston MA USA 2019.

ICG – TC3: School Thermodynamic of Glass, Erlangen, Tyskland 2019.

43rd International Conference and Expo on Advanced Ceramics and Composites, Daytona Beach, FL USA 2019.

15th International Conference on the Physics of Non-Crystalline Solids & 14th Conference of European Society of Glass, Saint Malo, Frankrike 2018.

23rd International Conference on Fluidized Bed Combustion, Seoul, Sydkorea 2018.

91st Annual Meeting of the German Glass Society, Weimar, Tyskland 2017.

12th Pacific Rim Conference on Ceramic and Glass Technology, including Glass & Optical Materials Division Meeting, Waikoloa, HI USA 2017.

Dare to Learn international event around learning and teaching, Helsingfors 2017.

41st International Conference and Expo on Advanced Ceramics and Composites, Daytona Beach, FL USA 2017.

Society of Glass Technology Centenary Conference, Sheffield, Storbritannien 2016.

24th International Congress on Glass, Shanghai, Folkrepubliken Kina 2016.

40th International Conference and Expo on Advanced Ceramics and Composites, Daytona Beach, FL USA 2016.

Turku Biomaterials Days, Åbo 2015.

27th European Conference on Biomaterials, Krakow, Polen 2015. International Commission on Glass annual meeting, Bangkok, Thailand 2015.

American Ceramic Society – Glass and Optical Materials Division and German Glass Society joint annual meeting, Miami, FL USA 2015.

39rd International Conference and Expo on Advanced Ceramics and Composites, Daytona Beach, FL USA 2015.

Forskningsprojekt och forskningsfinansiering

Projektfinansiering från 2018 framåt ca 4,7 M€ främst från Business Finland, Finlands Akademi, EU och direkt företagsfinansiering. De viktigaste projekten från 2017 framåt:

Business Finland

Personalized bio-based indicators and bio products for tissues, Co-Creation, 2022. 33.300€

Towards carbon neutral metals, TOCANEM. Co-Innovation, 2021–2023. 473.000€

Bio-based smart materials at biomaterial interface, BBI. Co-Creation och Co-Innovation, 2018-2022, 428.000€

Detection of Corrosion from Stainless Steel Implements, Decossi. New business research ideas. 2019–2021. 368.000€

Finlands Akademi

High temperature chemistry of phosphorus – pathways to more effective recycling and utilization. Konsortiumprojekt med professor Lindberg, Aalto. 2021–2025. 702.000€

EU

Developing flexible gas turbines for hydrogen and biogas (Bio-FlexGen), EU Horisont 2020. Tillsammans med docent Patrik Yrjas. 2022–2024. 127.000€

Ceramic demolition waste in circular economy, KERPUR. EU-React. 2021–2023. 269.000€

Utilization of large-scale side-streams and soil in cities, CircVol. ERUF, 2018–2021. 350.000€

Utilization of large-scale side-streams and soil in cities, CircVol2. ERUF, 2021–2022. 57.000€

Företag

Stabilisation of soil using clays, TUKEMA, Åbo stadsforskningsprogram 2021–2022, 150.000€

Clean and efficient utilization of demanding fuels, CLUE2. Andritz, Metsä Fibre, United Paper Mills, UPM-Kymmene, Valmet Technologies. Tillsammans med docenterna Markus Engblom och Patrik Yrjas. 2019–2022. 450.000€

Clean and efficient utilization of demanding fuels, CLUE. Andritz, Fortum, United Paper Mills, UPMKymmene, Valmet Technologies. Tillsammans med docenterna Patrik Yrjas och Markus Engblom. 2017–2019. 300.000€

Publikationer

Referentgranskade artiklar, artiklar i konferenspublikationer och bokkapitel

1. Sirkiä, S.V., Siekkinen, M., Qudsia, S., Smått, J.-H., Peltonen, J., **Hupa, L.**, Heino, T.J., Vallittu, P.K. (2022). Physicochemical and biological characterization of silica-coated alumina particles. *Dental Materials*. DOI: 10.1016/j.dental.2022.09.012
2. Brauer, D.S., **Hupa, L.** (2022) Glass as a biomaterial: strategies for optimising bioactive glasses for clinical applications. *Comptes Rendus Géoscience, Sciences de la Planète*. DOI: 10.5802/crgeos.134.
3. Hupa, L., Lindfors, N.C. (2022). Bioactive glass S53P4 – from a statistically suggested composition to clinical success. In: Francesco Baino (Ed.). *Bioactive Glasses and Glass-Ceramics: Fundamentals, Applications, and Advances*. Wiley, 2022. DOI: 10.1002/9781119724193.ch3.
4. El Hajam, M., Kandri, N.I., Zerouale, A., Wang, X., Gustafsson, J., Wang, L., Mäkilä, E., **Hupa, L.** & Xu, C. (2022). Lignocellulosic nanocrystals from sawmill waste as biotemplates for free-surfactant synthesis of photocatalytically active porous silica. *ACS Applied Material Interfaces*, 14(17), 19547-19560. DOI: 10.1021/acsami.2c02550.
5. Sinitsyna, P., Karlström, O., Sevoni, C., **Hupa, L.** (2022) In vitro dissolution and characterization of flame-sprayed bioactive glass microspheres S53P4 and 13-93. *Journal of Non-Crystalline Solids*, 291, 121736. DOI: 10.1016/j.jnoncrysol.2022.121736.
6. Eriksson, J.E., Zevenhoven, M., Yrjas, P., Brink, A., **Hupa, L.** (2022). Corrosion of heat transfer materials by potassium-contaminated ilmenite bed particles in chemical-looping combustion of biomass. *Energies*, 15(8), 2740. DOI: 10.3390/en15082740.
7. Siekkinen, M., Karlström, O., **Hupa, L.** (2022). Effect of local ion concentrations on the in vitro reactions of bioactive glass 45S5 particles. *International Journal of Applied Glass Science*, 13, 695-707. DOI: 10.1111/ijag.16579.
8. Bruun, N., Lehmusto, J., Tesfaye, F., Hemming, J., **Hupa, L.** (2022). Amino acids reduce mild steel corrosion in used cooking oils. *Sustainability*, 14(7), 3858. DOI: 10.3390/su14073858.
9. Simakova, I., Vajglová, Z., Mäki-Arvela, P., Eränen, K., **Hupa, L.**, Peura, M., Mäkilä, E., Wärnä, J., Murzin, D. (2022). Citral-to-menthol transformations in a continuous reactor over Ni/mesoporous aluminosilicate extrudates containing sepiolite clay binders. *Organic Process Research & Development*, 26(2), 387-403. DOI: 10.1021/acs.oprd.1c00435.
10. Tesfaye, F., Lindberg, D., Sukhomlinov, D., Taskinen, P., **Hupa, L.** (2022). Thermal Analysis and Optimization of the Phase Diagram of the Cu-Ag Sulfide System. *Energies*, 15(2), 593. DOI: 10.3390/en15020593.
11. Santoso, I., Riihimäki, M., Sibrani, D., Taskinen, P., **Hupa, L.**, Paek, M.K., Lindberg, D. (2022). Impact of recently discovered sodium calcium silicate solutions on the phase diagrams of relevance for glass-ceramics in the Na₂O-CaO-SiO₂ system. *Journal of the European Ceramic Society*, 42(5), 2449-2463. DOI: 10.1016/j.jeurceramsoc.2022.01.010.
12. Bruun, N., Lehmusto, J., Hemming, J., Tesfaye, F., **Hupa, L.** (2022). Metal rod surfaces after exposure to used cooking oils. *Sustainability (Switzerland)*, 14(1), 355. DOI: 10.3390/su14010355.
13. Vajglova, Z., Simakova, I., Eränen, K., Mäki-Arvela, P., Kumar, N., Peurla, M., Tolvanen, S., Efimov, A., **Hupa, L.**, Peltonen, J., Murzin, D.Yu. (2022). The physicochemical and catalytic properties of clay extrudages in cyclization of citronellal. *Applied Catalysis A: General*. 629, 118426. DOI: 10.1016/j.apcata.2021.118426.
14. Tesfaye, F., Lindberg, D., Moroz, M., Hupa, M., **Hupa, L.** (2022). Copper in biomass fuels and its effect on combustion processes. In F. Tesfaye, L. Zhang, D. P. Guillen, Z. Sun, A. A. Baba, N. R. Neelameggham, M. Zhang, D. E. Verhulst, & S. Alam (Eds.), *REWAS 2022: Energy Technologies and CO2 Management (Volume II)* (1 ed., Vol. 2, pp. 13-20). (The Minerals, Metals & Materials Series). Springer International Publishing. https://doi.org/10.1007/978-3-030-92559-8_2.
15. Moroz, M., Tesfaye, F., Demchenko, P., Prokhorenko, M., Perviznyk, O., Rudyk, B., Soliak, L., Lindberg, D., Reshetnyak, O., **Hupa, L.** (2022). Phase Equilibria in the Ag-Ge-Bi-Te System and Thermodynamic Properties of the nGeTe_x-Bi₂Te₃ (n, m = 1-4) Layered Compounds. In TMS 2022 151st Annual Meeting and Exhibition Supplemental Proceedings (1 ed., Vol. 1, pp. 60-73). (Minerals, Metals and Materials Series). Springer International Publishing. https://doi.org/10.1007/978-3-030-92381-5_7.
16. Heberlein, S., Chan, W.P., Veksha, A., Giannis, A., **Hupa, L.**, Lisak, G. (2022). High temperature slagging gasification of municipal solid waste with biomass charcoal as a greener auxiliary fuel. *Journal of Hazardous Materials*, 423, 127057. DOI: 10.1016/j.jhazmat.2021.127057.
17. Shumilov, V., Kirilin, A., Tokarev, A., Boden, S., Schubert, M., Hampel, U., **Hupa, L.**, Salmi, T., Murzin, D.Y. Preparation of gamma-Al₂O₃/alfa-Al₂O₃ ceramic foams as catalyst carriers via the replica technique. (2022). *Catalysis Today*, 383, 64-73. DOI: 10.1016/j.cattod.2020.09.019.
18. Sinitsyna, P., Karlström, O., **Hupa, L.** (2022). In vitro dissolution of bioactive glass S53P4 microspheres. *Journal of the American Ceramic Society*, 105(3), 1658-70. DOI: 10.1111/jace.18014.
19. Wang, Q., Xua, W., Koppolu, R., van Bochove, B., Seppälä, J., **Hupa, L.**, Willför, S., Xu, C., Wang, X. Injectable thiol-ene hydrogel of galactoglucomannan and cellulose nanocrystals in delivery of therapeutic inorganic ions with embedded bioactive glass nanoparticles. (2022). *Carbohydrate Polymers*, 276, 118780. DOI: 10.1016/j.carbpol.2021.118780.
20. Bruun, N., Khazraie, T., Hemming, J., Willför, S., **Hupa, L.** (2022). Characterization of waste bio-oil as an alternate source of renewable fuel in marine engines. *Biofuels*, 13(1), 21-30. DOI: 10.1080/17597269.2019.1628481.
21. Wójcik, N.A., Sinitsyna, P., Ali, S., **Hupa, L.**, Jonson, B. (2021). In vitro dissolution of Na-Ca-P-oxynitrides. *Materials*, 14(23), 7425. DOI: 10.3390/ma14237425.
22. Eichhorn, J., Elschner, C., Groß, M., Reichenbacher, R., Herrera Martín, A. H., Prates Soares, A., Fischer, H., Kulkova, J., Moritz, N., **Hupa, L.**, Stommel, M., Schefler, C., Kilo, M. (2021). Spinning of endless bioactive silicate glass fibres for fibre reinforcement application. *Applied Sciences*, 11(17), 7927. DOI: 10.3390/app11177927.

23. Aalto-Setälä, L., Uppstu, P., Sinitsyna, P., Lindfors, N.C., **Hupa, L.** (2021). Dissolution of amorphous S53P4 glass scaffolds in dynamic in vitro conditions. *Materials*, 14(17), 4834. DOI: 10.3390/ma14174834.
24. Dirbeba, M.J., Brink, A., Lindberg, D., Hupa, M., **Hupa, L.** (2021). Thermal conversion characteristics of molasses. *ACS Omega* 6(33), 21631-21645. DOI: 10.1021/acsomega.1c03024.
25. Vainio, E., Vänskä, K., Laurén, T., Yrjas, P., Coda Zabetta, E., Hupa, M., **Hupa, L.** (2021). Impact of boiler load and limestone addition on SO₃ and corrosive cold-end deposits in a coal-fired CFB boiler. *Fuel*, 121313. DOI: 10.1016/j.fuel.2021.121313.
26. Sirkiä, S., Nakamura, M., Quesia, S., Siekkinen, M., Smätt, J.H., Peltonen, J., Heino, J., **Hupa, L.**, Vallittu, P.K. (2021). Structural and elemental characterization of glass and ceramic particles for bone surgery. *Dental Materials*, 37(9), 1350–1357. DOI: 10.1016/j.dental.2021.06.004.
27. Moroz, M., Tesfaye, F., Demchenko, P., Prokhorenko, M., Prokhorenko, S., Lindberg, D., Reshetnyak, O., **Hupa, L.** (2021). Synthesis and thermodynamic investigation of energy materials in the Ag-Te-Cl System by the solid-state galvanic cells. *JOM* 73(5), 1487-1494. DOI: 10.1007/s11837-021-04619-9.
28. Balint, R., Engblom, M., Niemi, J. Silva da Costa, D., Lindberg, D., Yrjas, P., **Hupa, L.**, Hupa, M. (2021). Temperature gradient induced changes within superheater ash deposits high in chlorine. *Energy*, 226, 120439. DOI: 10.1016/j.energy.2021.120438.
29. Eriksson, E., Björkenheim, R., Strömberg, G., Ainola, M., Uppstu, P., Aalto-Setälä, L., Leino, V.-M., **Hupa, L.**, Pajarinen, J., Lindfors, N.C. (2021). S53P4 bioactive glass scaffolds induce BMP expression and integrative bone formation in a critical-sized diaphysis defect treated with a single-staged induced membrane technique. *Acta Biomaterialia*, 126, 463–476. DOI: 10.1016/j.actbio.2021.03.035.
30. Lehmusto, J., Sattari, M., Halvarsson, M., **Hupa, L.** (2021). Should oxygen source be considered in the initiation of KCl-induced high-temperature corrosion? *Corrosion Science*, 183, 109332. DOI: 10.1016/j.corsci.2021.109332.
31. Moroz, M., Tesfaye, F., Demchenko, P., Prokhorenko, M., Yarema, N., Lindberg, D., Reshetnyak, O., **Hupa, L.** (2021). The equilibrium phase formation and thermodynamic properties of functional tellurides in the Ag-Fe-Ge-Te system. *Energies*, 14(5), 1314. DOI: 10.3390/en14051314.
32. Abushaba, F., Gürsoy, M., Hupa, L., Närhi, T.O. (2021). Effect of bioactive glass air-abrasion on *Fusobacterium nucleatum* and *Porphyromonas gingivalis* biofilm formed on moderately rough titanium surface. *European Journal of Oral Sciences*. DOI: 10.1111/eos.12783.
33. Vajglóvá, S., Kumar, N., Peurla, M., **Hupa, L.**, Semikin, K., Sladkovskiy, D.A., Murzin, D.Yu. (2021). Deactivation and regeneration of Pt-modified zeolite Beta-Bindzil extrudates in n-hexane hydroisomerization. *Journal of Chemical Technology & Biotechnology*, 96(6), 1645–1655. DOI: 10.1002/jctb.6685.
34. Ke, X., Engblom, M., Zhang, M., S.P. da Silva, P., **Hupa, L.**, Lyu, H., Yang, H., Wei, G. (2021). Modeling of the axial distributions of volatile species in a circulating fluidized bed boiler. *Chemical Engineering Science*, 233, 11643. DOI: 10.1016/j.ces.2021.116436.
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