

### Higher Education Qualifications

1992 MSc Polymer Chemistry, University of Helsinki, Finland

### Doctoral degree

1996 Polymer Technology, Kungliga Tekniska högskolan (KTH), Sweden

### Docent

2002 Polymer Technology, Kungliga Tekniska högskolan (KTH), Sweden

**Current position: Professor** in Polymer Technology at KTH (2011-now)

**Head of Polymer Technology** Division, KTH (2012-now)

**Previous employments** at KTH: Assoc. Prof. 2002-2011, Research assistant (Ass. Prof.). 1997-2002, PhD student 1992-1996.

### Other position and assignments:

- Vice Head of Department of Fibre and Polymer Technology, KTH (2011-2018)
- Academic programme coordinator, master programme Macromolecular Materials (2009-2016) and Nordic master in Polymer Technology (2013-2016)
- Member of the programme committee for the PhD programme in Chemical Science and Engineering, Track responsible for Fibre and Polymer Science (2011-2017)
- Member of the PhD Education Quality Council CBH school (2019-2021)
- Appointment committee for SCI School (2008-15)
- Vice-chair of Recruitment committee School of CHE (2015-2017)
- Member of the KTH Promotion Committee (2015-2019)
- Selected member of GOFL, Gender and Change Management Programme at KTH (2017-)
- Selected member of CBH School Collegium (2020-2021)
- Vice-coordinator of Panel 3 KTH Research Assessment exercise (2020-2021)

**Research interests.** Sustainable degradable, biobased and/or recyclable polymer materials. Interplay and dependencies between polymer structure-environment-degradation. Valorization of waste/by-products to value added chemicals and carbon products and further utilization of these for design of new functional materials. Microwave processes. Additive manufacturing. Biobased hydrogels.

**Publications** ~200 peer-reviewed articles, several book chapters, 1 book, > 130 conference abstracts, 3 editorials, h-index 47, i10-index 151, citations 7693 (google scholar).

**Co-author of textbook:** U.W. Gedde, M.S. Hedenqvist, M. Hakkarainen, F. Nilsson, O. Das, Applied Polymer Science, Springer October 2021.

**Perspective:** A.-C. Albertsson, M. Hakkarainen, Designed to degrade-Suitably designed degradable polymers can play a role in reducing plastic waste, *Science* 358, 2017, 872

Included in the list of **World's Top 2% scientists** in study performed by Stanford University (see: <https://elsevier.digitalcommonsdata.com/datasets/btchxktzyw/3>) 2019, 2020, 2021

### Supervising experience: Main supervisor of 16 PhD (concluded)

- Mikael Gröning, 2004 • Annika Lindström, 2007 • Jonas Alin, 2012 • Edwin Azwar, 2012
- Bo Yin, 2013 • Sofia Regnell Andersson, 2013 • Nina Aminlashgari, 2014. • Huan Xu, 2016
- Xi Yang, 2016. • Duo Wu, 2016. • Karin Adolfsson, 2019 • Zhaoxuan Feng, 2019
- Yunsheng Xu, 2020 • Eva Bäckström, 2021, • Nejla Erdal, 2021 • Wenxiang Xuan, 2021

**Postdocs:** Prasun K. Roy 2010-2011, Salman Hassanzadeh 2013-2015, Michal Michalak 2014-2015, Jun M. Koo 2018-2019, Giuseppe Melilli 2018-2019, Stefano Gazzotti 2020, Nisha Yadav 2019-2021.

**Supervisor of > 60 master and 30 bachelor theses and > 10 visiting researchers.**

**Currently main supervisor of 2 PhD students** Jenevieve Yao, Karla Garfias, **1 visiting PhD student** Meiling Zhang, **and 4 postdocs:** Karin Adolfsson (2019-), Sathiyaraj Subramaniyan (2021-), Anna Liguori (2021-), Nejb Kasmi (2021-)

**Co-supervisor of 8 PhD students** at KTH: Linnea Cederholm, Alessio Truncali, Ximena Lopez Lorenzo, Philip Jansson, Lukas M. Celada. At Borås University: Sofie Svensson and Najmeh Mousavi and at Politecnico di Torino: Camilla Noé.

**On-going research projects as main applicant:**

- **Formas:** Recyclable cellulose thermosets with sunlight triggered self-destruction in open natural environments (2022-2025)
- **Wenner-Gren Foundation:** Degradability and environmental impacts of modified lignocellulose materials (2022-2024)
- **Carl Tryggers Foundation:** Next generation face masks and wet wipes: From biobased raw materials to self-disinfecting and self-destructive products (2022-2024)
- **Wallenberg Wood Science Center, Knut and Alice Wallenberg Foundation.** (Bio)degradability of modified biopolymers and bioplastics (2021-23)
- **Dutch Polymer Institute:** RECOMP Recyclable high-performance composites (2021-25)
- **Lantmännens Forskningsstiftelse:** Next generation renewable filament for additive manufacturing (2020-22)
- **Richertska stiftelse:** Enhanced environmentally degradable cellulose plastics (2021-22),
- **Swedish Research Council (VR):** Microwave processing lignin: from multifunctional carbon dots to thermoset composites and bioactive surfaces (2019-22)

**Host for personal postdoc grants:**

- **H2020-MSCA-IF-2020 SUSTAINABLE:** Library of inedited bio-based multicomponent resins for the 3D-printing. (A. Liguori 2021-23).

**International collaboration projects:**

- **VR-Swedish research links:** Development of bioplastics from agricultural residues in Uganda (2021-23)
- **VR: Indo-Swedish joint network grant,** Intricate functional scaffolds produced via solvent free single step process (2020-22, IIT Delhi),

**On-going projects as co-applicant:**

- **Swedish Energy Agency:** Täckta elektrokatalysatorer för effektiv elektrolys (A Cornell, KTH 2021-26)
- **Formas:** Renewable High-Performance Materials from the Forest with Designed Degradation (P Olsén KTH 2021-25)
- **The Kamprad Family Foundation:** Biobreak – Biocatalytic breakdown of plastics (PO Syrén KTH 2020-23)
- **Vinnova:** Hållbara svamptextiler (A Zamani, University of Borås 2019-22).
- **Formas:** Catalytic Conversion of Waste to Value (H. Lundberg, KTH 2022-2025)
- **Carl Tryggers Foundation:** Lignin-based reprocessible polymer materials (M. Sipponen, SU 2022-2024)

**Several plenary, keynote and invited conference presentation yearly, since 2018:**

- Baltic Breakfast, Östersjöcentrum, 2018 ● 256th ACS National Meeting, 2018, Boston, USA
- "Biochemicals Certification Center" opening ceremony's symposium, 2018, Research Center for Bio-based Chemistry of Korea Research Institute of Chemical Technology (KRICT), Republic of Korea. ● 12th Annual MatSurf Seminar ● Circular Economy -Rethink the use of materials, SPOMAN Open Science, Denmark, 2018 (opening lecture) ● Milan Polymer Days, Mipol2019, Milan, Italy ● Is the future of polymer sustainable? Sustainable future of the plastic industry, Belgium, 2019 ● 257th ACS National Meeting, Orlando, Florida, 2019, ● 35<sup>th</sup>

Regional Conference of the Polymer Processing Society (PPS2019), South Africa • Taishan Academic Forum-Materials on New Energy & 2nd International New Energy Forum, Qingdao, China, 2019 • STEPS webinar Governing the transition to sustainable plastics:2020 • Lamiflex: Webinar on Plastic recycling, 2021 • FibRe workshop, 2021 • Nordic Polymer Days 2021.

**Organizing committee or co-chair** of several conferences, for example: e-MRS spring conference, symposium P 2019, BIOPOL 2019, Nordic-Italian Polymer Future2019, Macro2020+ (session organizer polymers and environment) 2021 **Scientific committee** of e.g. 35<sup>th</sup> Regional Conference of the Polymer Processing Society (PPS2019), South Africa.

**Invited research presentations and research visits at Universities since 2017:** University of New South Wales, Australia (2017), China University of Petroleum (2017), Changwon National University, South Korea (2019), Politecnico di Torino, Italy (2019).

**Editorial Advisory Board:** Biomacromolecules (2019-), Polymer Testing (2018-), SN Applied Sciences (2019-), Advances in Polymer Technology (2018-)

**Expert and/or member of evaluation board/review panel** for several research calls (e.g. VR 2019, VR2020, VR2021, Swedish Institute 2019, Academy of Finland 2020, 2021), multiple faculty/tenure track positions and docent applications in Sweden and abroad.

**2x opponent, member** of ~40 Ph.D. theses evaluation boards. Pre-/international reviewer of >10 PhD theses.

### Teaching and outreach

- Currently lecturer and examiner of master course in Polymer Physics and PhD course in Characterization methods in Fibre and Polymer Technology. Previously lecturer and/or examiner of several courses.
- Responsible with two other persons and GA for development of three new master programmes for the school of Chemical sciences in 2009, continued then as Academic programme director of master programme Macromolecular Materials (2009-16).
- Main responsible and coordinator for development of a Nordic master program in Polymer Technology, a double degree programme between Aalto, DTU, Chalmers, NTNU and KTH. Remained as coordinator and academic director of the program (2013-2016).
- Working group for development of chemistry laboratories for House of Science in 2015
- Contact person for high school collaboration (2004-2008)
- In 2013 developed and arranged a course "Polymers for Future Society" for Stockholm Summer School together with Prof. A. Finne-Wistrand.
- Presenter of several "popular science" lectures on polymers and sustainability, recyclable or biodegradable plastics.
- Interviews and research highlights in several newspapers, popular science journals

**Fellow of the Royal Society of Chemistry**

**Member of the American Chemical Society**

**Member of Polymer Processing Society**

One of 7 academic members selected for **FORMAS Scientific Council** (2016-2018) presenting all Swedish universities

Homepage: <https://www.kth.se/fpt/polymer-technology>

Publications: <https://www.kth.se/profile/minna/publications>

## Publications

198. C. Pronoitis, M. Hakkarainen, K. Odelius, Structurally diverse and recyclable isocyanate-free polyurethane networks from CO<sub>2</sub>-derived cyclic carbonates, *ACS Sustainable Chem. Eng.* **Impact factor 8.198**
197. N. Yadav, M. Hakkarainen: Degradation of Cellulose Acetate Films in Different Aqueous Environments: One-Year Study, *Macromol. Mater. Eng.* <https://doi.org/10.1002/mame.202100951> Special issue on Sustainable Macromolecular Materials and Engineering. **Impact factor 4.367**
196. A. Liguori, M. Hakkarainen, Designed from biobased materials for recycling: Imine-based covalent adaptable networks, *Macromol. Rapid Commun.* 2 (2022) 2100816. Special Issue on Sustainable Green Polymerizations and End-of-Life Treatment of Polymers. **Impact factor 5.734.**
195. C. Noè, M. Hakkarainen, S. Malburet, A. Graillot, K. Adekunle, M. Skrifvars, M. Sangermano, Frontal-photopolymerization of fully biobased epoxy composites, *Macromol. Mater. Eng.* (2022) 2100864. Special issue on Sustainable Macromolecular Materials and Engineering **Impact factor 4.367**
194. M. Zanon, A. Chiappone, N. Garino, M. Canta, F. Frascella, M. Hakkarainen, C. Fabrizio Pirri, M. Sangermano: Microwave-assisted methacrylation of chitosan for 3D printable hydrogel in tissue engineering, *Mater. Adv.* 3 (2022) 514.
193. E. R. Kanishka, B. Wijayarathna, G. Mohammadmahani, A. M. Soufiani, K. H. Adolfsson, J. A. Ferreira, M. Hakkarainen, L. Berglund, I. Heinmaa, A. Root, A. Zamani, Fungal textile alternatives from bread waste with leather-like properties, *Resour. Conserv. Recycl.* **Impact factor 10.204**
192. C. Noè, A. Cosola, A. Chiappone, M. Hakkarainen, H. Grützmacher, M. Sangermano, From polysaccharides to UV-curable biorenewable organo/hydrogels for methylene blue removal, *Polymer*, 235 (2021) 124257. **Impact factor 4.430**
191. C. Pronoitis, M. Hakkarainen, K. Odelius, Long-chain polyamide covalent adaptable networks based on renewable ethylene brassylate and disulfide exchange, *Polym. Chem.* 12 (2021) 5668-5678. **Impact factor 5.582**
190. S. De Lima, N.B. Erdal, K.H. Adolfsson, M. Hakkarainen, M. Kugelberg, Rupture and chemical accumulation in contact lenses with dexamethasone eye drop administration after congenital cataract surgery, *Acta Ophthalmologica*, (2021) **Impact factor 3.761**
189. H. Xu, M. Shen, H. Shang, W. Xu, S.-H. Zhang, H.-R. Yang, D. Zhou, M. Hakkarainen, Osteoconductive and antibacterial poly(lactic acid) fibrous membranes impregnated with biobased nanocarbons for biodegradable bone regenerative scaffolds, *I & EC Research*, 60 (2021) 12021–12031. **Impact factor 3.720**
188. K. H. Adolfsson, I. Sjöberg, O. V. Höglund, O. Wattle, M. Hakkarainen, In vivo versus in vitro degradation of a 3D printed resorbable device for ligation of vascular tissue in horses, *Macromol. Biosci.* (2021) 2100164. **Impact factor 4.979**
187. W. Xuan, K. Odelius, M. Hakkarainen, Tunable Polylactide Plasticizer Design: Rigid Stereoisomers, *Eur. Polym. J.* 157 (2021) 110649. **Impact factor 4.598**

186. G. Mohammadkhani, S.K. Ramamoorthy, K.H. Adolfsson, A. Mahboubi, M. Hakkarainen, A. Zamani, New solvent and coagulating agent for development of chitosan fibers by wet spinning, *Polymers* 13 (2021) 2121. **Impact factor 4.329**
185. Z. Feng, K. Adolfsson, Y. Xu, H. Fang, M. Hakkarainen, M. Wu, Carbon dot/polymer nanocomposites: From green synthesis to energy, environmental and biomedical applications, *Sustain. Mater. Technol.* 29 (2021) e00304 **Impact factor 7.053**
184. J.G. Yao, K. Odelius, M. Hakkarainen, Microwave Hydrophobized Lignin with antioxidant activity for fused filament fabrication, *ACS Appl. Polymer Mater.* 3 (2021) 3538-3548 **Impact factor 4.089**
183. E. Bäckström, K. Odelius, M. Hakkarainen, Microwave assisted selective hydrolysis of polyamides from multicomponent carpet waste, *Glob. Chall.* 5 (2021) 2000119. **Impact factor 3.847**
182. N. Yadav, K.H. Adolfsson, M. Hakkarainen, Carbon dot triggered photocatalytic degradation of cellulose acetate, *Biomacromolecules* 22 (2021) 2211–2223. **Impact factor 6.988**
181. E. Bäckström, K. Odelius, M. Hakkarainen, Ultrafast microwave assisted recycling of PET to a family of functional precursors and materials, *Eur. Polym. J.* 151 (2021) 110441. **Impact factor 4.598**
180. H. Xu, J. Zhou, K. Odelius, Z. Guo, X. Guan, M. Hakkarainen, Nanostructured Phase Morphology of a Biobased Copolymer for Tough and UV-Resistant Polylactide, *ACS Appl. Polymer Mater.* 3 (2021) 1973-1982. **Impact factor 4.089**
179. S. Svensson, J. Ferreira, M. Hakkarainen, K. Adolfsson, A. Zamani, Fungal textiles: Wet spinning of fungal microfibers to produce monofilament yarns, *Sustain. Mater. Technol.* 28 (2021) e00256. **Impact factor 7.053**
178. C. Noè, C. Tonda-Turo, I. Carmagnola, M. Hakkarainen, M. Sangermano, UV-Cured biodegradable methacrylated starch-based coatings, *Coatings* 11 (2021) 127. **Impact factor 2.881**
177. C. Noè, M. Hakkarainen, M. Sangermano, Cationic UV-curing of epoxidized biobased resins, *Polymers* 13 (2021) 89. **Impact factor 4.329**
176. N. Yadav, M. Hakkarainen, Degradable or not? Cellulose Acetate as a Model for Complicated Interplay Between Structure, Environment and Degradation, *Chemosphere* 265 (2021) 128731. **Impact factor 7.086**
175. C. Pronoitis, M. Hakkarainen, K. Odelius, Solubility-governed architectural design of polyhydroxyurethane–graft–poly( $\epsilon$ -caprolactone) copolymers, *Polym. Chem.* 12 (2021) 196-208. **Impact factor 5.582**
174. G. Melilli, J. Yao, A. Chiappone, M. Sangermano, M. Hakkarainen, Photocurable “all-lignocellulose” derived hydrogel nanocomposites for adsorption of cationic contaminants, *Sustain. Mater. Technol.* 27 (2021) e00243. **Impact factor 7.053**
173. A. Koyejo, L. Kesavan, P. Damlin, M. Salomäki, J.G. Yao, M. Hakkarainen, C. Kvarnström, Bio-based Reduced Nano Graphene Oxide Supported Gold Nanoparticles for Electrocatalysis, *ChemElectroChem* 7 (2020) 4889-4899. **Impact factor 4.590**

172. Y. Xu, K. Odelius, M. Hakkarainen, Photocurable, thermally reprocessable and chemically recyclable vanillin-based imine thermosets, *ACS Sustainable Chem. Eng.* 8 (2020) 17272-17279. **Impact factor 8.198**

171. Y. Xu, K. Adekunle, S. K. Ramamoorthy, M. Skrifvars, M. Hakkarainen, Methacrylated lignosulfonate as compatibilizer for flax fiber reinforced biocomposites with soybean-derived polyester matrix, *Compos. Commun.* 22 (2020) 100536. **Impact factor 6.617**

170. N. B. Erdal, G. Albara Lando, A. Yadav, R. K. Srivastava, M. Hakkarainen, Hydrolytic Degradation of Porous Crosslinked Poly( $\epsilon$ -Caprolactone) Synthesized by High Internal Phase Emulsion Templating, *Polymers* 12 (2020) 1849. **Impact factor 4.329**

169. G. Melilli, I. Carmagnola, C. Tonda-Turo, C. Fabrizio Pirri, G. Ciardelli, M. Sangermano, M. Hakkarainen, A. Chiappone, DLP 3D printing meets Lignocellulosic Biopolymers: Carboxymethyl Cellulose inks for 3D Biocompatible hydrogels, *Polymers* 12 (2020) 1655. **Impact factor 4.329**

168. W. Xuan, K. Odelius, M. Hakkarainen, Dual-functioning Antibacterial Eugenol-derived Plasticizers for Polylactide, *Biomolecules* 10 (2020) 1077. **Impact factor 4.879**

167. K. H. Adolfsson, G. Melilli, M. Hakkarainen, Oxidized carbonized cellulose-coated filters for environmental contaminant adsorption and detection, *Ind. Eng. Chem. Res.* 59 (2020) 13578-13587. **Impact factor 3.720**

166. C. Noè, C. Tonda-Turo, A. Chiappone, M. Sangermano, M. Hakkarainen, Light processable starch hydrogels, *Polymers* 12 (2020) 1359. **Impact factor 4.329**

165. J. Yao, K. Odelius, M. Hakkarainen, Carbonized lignosulfonate-based porous nanocomposites for adsorption of environmental contaminants, *Funct. Compos. Mater.* 1 (2020) 5.

164. Y. Xu, K. Odelius, M. Hakkarainen, Recyclable and flexible polyester thermosets derived from microwave processed lignin, *ACS Appl. Polymer Mater.* 2 (2020) 1917-1924. **Impact factor 4.089**

163. L. Cederholm, P. Olsén, M. Hakkarainen, K. Odelius, Turning natural delta-lactones to thermodynamically stable polymers with triggered recyclability, *Polym. Chem.* 11 (2020) 4883-4894. **Impact factor 5.582** COVER IMAGE

162. K. H. Adolfsson, N. Yadav, M. Hakkarainen, Cellulose-derived hydrothermally carbonized materials and their emerging applications, *Curr. Opin. Green Sustain. Chem.* 23 (2020) 18-24. **Impact factor 6.457**

161. E. McGivney, L. Cederholm, A. Barth, M. Hakkarainen, E. Hamacher-Barth, M. Ogonowski, E. Gorokhova, Rapid physicochemical changes in microplastic induced by biofilm formation, *Front. Bioeng. Biotechnol.* 8 (2020) 205. **Impact factor 5.890**

160. L. H. Gustavsson, K. H. Adolfsson, M. Hakkarainen, Thermoplastic "all-cellulose" composites with covalently attached carbonized cellulose, *Biomacromolecules* 21 (2020) 1752-1761. **Impact factor 6.988**

159. C. Tonda-Turo, I. Carmagnola, A. Chiappone, Z. Feng, G. Ciardelli, M. Hakkarainen, M. Sangermano, Photocurable chitosan as bioink for cellularized therapies towards personalized scaffold architecture, *Bioprinting* 18 (2020) e00082.

158. G. Melilli, K. Adolfsson, A. Impagnatello, G. Rizza, M. Hakkarainen, Microwave assisted hydrothermal carbonization of sodium lignosulfonate, *Glob. Chall.* 4 (2020) 1900111. **Impact factor 3.847**

157. L. Cederholm, Y. Xu, A. Tagami, O. Sevastyanova, K. Odelius, M. Hakkarainen, Microwave processing lignin in green solvents: A high yield process to narrow dispersity oligomers, *Ind. Crops Prod.* 145 (2020) 112152. **Impact factor 5.645**

156. M. Golda-Cepa, K. Engvall, M. Hakkarainen, A. Kotarba, Recent progress on parylene C polymer for biomedical applications: a review, *Progr. Org. Coat.* 140 (2020) 105493. **Impact factor 5.161**

155. A. Yadav, N. B. Erdal, M. Hakkarainen, B. Nandan, R. K. Srivastava, Cellulose-Derived Nano-Graphene Oxide Reinforced Macroporous Scaffolds of High Internal Phase Emulsion Templated Cross-linked Poly( $\epsilon$ -caprolactone), *Biomacromolecules* 21 (2020) 589-596. **Impact factor 6.988**

154. J. M. Koo, J. Kang, S.-H. Shin, J. Jegal, H. G. Cha, S. Choy, M. Hakkarainen, J. Park, D. X. Oh, S. Y. Hwang, Biobased Thermoplastic Elastomer with Seamless 3D-Printability and Superior Mechanical Properties Empowered by In-situ Polymerization in the Presence of Nanocellulose, *Compos. Sci. Technol.* 185 (2020) 107885. **Impact factor 8.528**

153. T. Rahimi-Aghdama, Z. Shariatnia, M. Hakkarainen, V. Haddadi-Asl, Nitrogen and phosphorous doped graphene quantum dots: Excellent flame retardants and smoke suppressants for polyacrylonitrile nanocomposites, *J. Hazard. Mater.* 381 (2020) 121013. **Impact factor 10.588**

152. J. Alongi, P. Ferruti, A. Manfredi, F. Carosio, Z. Feng, M. Hakkarainen, E. Ranucci, Superior flame retardancy of cotton by synergetic effect of cellulose-derived nano-graphene oxide carbon dots and disulphide-containing polyamidoamines, *Polym. Degrad. Stab.* 169 (2019) 108993. **Impact factor 5.030**

151. T. Rahimi-Aghdama, Z. Shariatnia, M. Hakkarainen, V. Haddadi-Asl, Polyacrylonitrile/N,P co-doped graphene quantum dots-layered double hydroxide nanocomposite: Flame retardant property, thermal stability and fire hazard, *Eur. Polym. J.* 120 (2019) 109256. **Impact factor 4.598**

150. C. Pronoitis, G. Hua, M. Hakkarainen, K. Odelius, Biobased Polyamide Thermosets: From a Facile One-Step Synthesis to Strong and Flexible Materials, *Macromolecules* 52 (2019) 6181-6191. **Impact factor 5.985**

149. Y. Xu, K. Odelius, M. Hakkarainen, One-pot synthesis of lignin thermosets exhibiting widely tunable mechanical properties and shape memory behaviour, *ACS Sustainable Chem. Eng.* 7 (2019) 13456-13463. **Impact factor 8.198**

148. W. Xuan, M. Hakkarainen, K. Odelius, Levulinic acid as a versatile building block for plasticizer design, *ACS Sustainable Chem. Eng.* 7 (2019) 12552-12562 **Impact factor 8.198**

147. N. B. Erdal, M. Hakkarainen, A. G Blomqvist, Polymers – giant molecules with properties: An entertaining activity introducing polymers to young students, *J. Chem. Educ.* 96 (2019) 1691-1695. **Impact factor 2.979 Pedagogical article**

146. Z. Feng, M. Hakkarainen, H. Grützmacher, A. Chiappone, M. Sangermano, Photoinduced chitosan hydrogels reinforced with chitosan derived nano-graphene oxide, *Macromol. Chem. Phys.* 2019, 1900174. **Impact factor 2.527**
145. E. Bäckström, K. Odelius, M. Hakkarainen, Designed from Recycled: Turning Polyethylene Waste to Covalently Attached PLA Plasticizers, *ACS Sustainable Chem. Eng.* 7 (2019) 11004-11013. **Impact factor 8.198**
144. S. S. Delekta, K. H. Adolfsson, N. B. Erdal, M. Hakkarainen, M. Östling, J. Li, Fully Inkjet Printed Ultrathin Microsupercapacitors Based on Graphene Electrodes and nano-Graphene Oxide Electrolyte, *Nanoscale* 11 (2019) 10172-10177. **Impact factor 7.790**
143. F. Bianchi, S. Agazzi, N. Riboni, N. Erdal, M. Hakkarainen, L. L. Ilag, L. Anzillotti, R. Andreoli, F. Marezza, F. Moroni, R. Cecchi, M. Careri, Novel sample-substrates for the determination of new psychoactive substances in oral fluid by desorption electrospray ionization-high resolution mass spectrometry, *Talanta* 202 (2019) 136-144. **Impact factor 6.057**
142. Z. Feng, T. Danjo, K. Odelius, M. Hakkarainen, T. Iwata, A.-C. Albertsson, Recyclable fully biobased chitosan adsorbents spray-dried in one-pot to microscopic size and enhanced adsorption capacity, *Biomacromolecules* 20 (2019) 1956-1964. **Impact factor 6.988**
141. K. H. Adolfsson, M. Golda-Cepa, N. B. Erdal, J. Duch, A. Kotarba, M. Hakkarainen, Importance of Surface Functionalities for Antibacterial Properties of Carbon Spheres, *Adv. Sustain. Syst.* 3 (2019) 1800148. **Impact factor 6.271**
140. S. Gazzotti, R. Rampazzo, M. Hakkarainen, D. Bussini, M. A. Ortenzi, H. Farina, G. Lesma, A. Silvani, Cellulose Nanofibrils as reinforcing agents for PLA-based nanocomposites: an *in situ* approach, *Compos. Sci. Technol.* 171 (2019) 94-102. **Impact factor 8.528**
139. N.B. Erdal, J.G. Yao, M. Hakkarainen, Cellulose Derived Nano-Graphene Oxide Surface Functionalized 3D Scaffolds with Drug Delivery Capability, *Biomacromolecules* 20 (2019) 738-749. **Impact factor 6.988**
138. S. Gazzotti, M. Hakkarainen, K. H. Adolfsson, M.A. Ortenzi, H. Farina, G. Lesma, A. Silvani, One-pot synthesis of sustainable high-performance thermoset by exploiting eugenol functionalized 1,3-dioxolan-4-one, *ACS Sustainable Chem. Eng.* 6 (2018) 15201- 15211. **Impact factor 8.198**
137. K.H. Adolfsson, C.-f. Lin, M. Hakkarainen, Microwave assisted hydrothermal carbonization and solid state post modification of carbonized polypropylene, *ACS Sustainable Chem. Eng.* 6 (2018) 11105-11114. **Impact factor 8.198**
136. Y. Xu, G. Hua, M. Hakkarainen, K. Odelius, Isosorbide as core component for tailoring biobased unsaturated polyester thermosets for a wide structure-property window, *Biomacromolecules* 19 (2018) 3077-3085. **Impact factor 6.988**
135. Z. Feng, K. Odelius, M. Hakkarainen, Tunable chitosan hydrogels for adsorption: property control by biobased modifiers, *Carbohydr. Polym.* 196 (2018) 135-145. **Impact factor 9.381**
134. D. Wu, A. Samanta, R. K. Srivastava, M. Hakkarainen, Nano-graphene oxide functionalized Bioactive PLA and PCL nanofibrous scaffolds, *Materials* 11 (2018) 566. **Impact factor 3.623**



133. Z. Feng, K. Odellius, G. K. Rajarao, M. Hakkarainen, Microwave carbonized cellulose for trace pharmaceutical adsorption, *Chem. Eng. J.* 346 (2018) 557-566. **Impact factor 13.273**
132. N. B. Erdal, M. Hakkarainen, Construction of bioactive and reinforced bioresorbable nanocomposites by biobased reduced nano-graphene oxide, *Biomacromolecules* 19 (2018) 1074-1081 **Impact factor 6.988**
131. N.B. Erdal, K. H. Adolfsson, S. De Lima, M. Hakkarainen, In vitro and in vivo effects of ophthalmic solutions on silicone hydrogel bandage lens material Senofilcon A, *Clin. Exp. Optom.* 101 (2018) 354-362. **Impact factor 4.207**
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