

Delrapportspublikationer inom KKS Synergi 16 (1 jan 2018 – 31 dec 2018)

Diarienummer : 20170059

Projekttitel : BIO-QC - Kvalitetskontroll och rening av nya biologiska läkemedel

Total projektperiod : 2017-11-01 - 2020-12-31

www.FSSG.se/BIO-QC.

A. Referee judged Articles published 2018 thanks the KKS BIO-QC support and thus also thanked in Acknowledgements with grant number (20170059).

- A1) P. Forssén, E. Multia, J. Samuelsson, M. Andersson, T. Aastrup, S. Altun, D. Wallinder, L. Wallbing, Th. Liangsupree, M.L. Riekkola, T. Fornstedt. *Reliable Strategy for Analysis of Complex Biosensor Data*. Anal. Chem. 2018, 90, 5366–5374. <https://doi.org/10.1021/acs.analchem.8b00504>
- A2) Jörgen Samuelsson, Marek Leško, Martin Enmark, Joakim Höglblom, Anders Karlsson, Krzysztof Kaczmarski. *Optimizing Column Length and Particle Size in Preparative Batch Chromatography Using Enantiomeric Separations of Omeprazole and Etiracetam as Models: Feasibility of Taguchi Empirical Optimization*. Chromatographia (2018) 81:851–860. <https://doi.org/10.1007/s10337-018-3519-z>
- A3) Ye Zhang, Rongfang Gong, Mårten Gulliksson, Xiaoliang Cheng. *A coupled complex boundary expanding compacts method for inverse source problems*. Journal of Inverse and Ill-posed Problems, 27(1) (2018) pp. 67-86. <https://doi.org/10.1515/jiip-2017-0002>
- A4) Ye Zhang, Rongfang Gong, Xiaoliang Cheng, M. Gulliksson. *A dynamical regularization algorithm for solving inverse source problems of elliptic partial differential equations*. Inverse Problems, Volume 34 (2018) No 6. <https://iopscience.iop.org/article/10.1088/1361-6420/aaba85/meta>
- A5) C.M. Vera, J. Samuelsson, T. Fornstedt, G.R. Dennis, R.A. Shalliker. *Protocol for the visualisation of axial temperature gradients in ultra-high performance liquid chromatography using infrared cameras*. Microchemical Journal 141 (2018) 141–147. <https://doi.org/10.1016/j.microc.2018.05.004>
- A6) Martin Enmark, Emelie Glenne, Marek Leško, Annika Langborg Weinmann, Tomas Leek, Krzysztof Kaczmarski, Magnus Klarqvist, Jörgen Samuelsson, Torgny Fornstedt. *Investigation of robustness for supercritical fluid chromatography separation of peptides: Isocratic vs gradient mode*. In Journal of Chromatography A, 1568 (2018) 177–187. <https://doi.org/10.1016/j.chroma.2018.07.029>
- A7) C.M. Vera, J. Samuelsson, T. Fornstedt, G. R. Dennis, R. A. Shalliker. *Visualisation of axial temperature gradients and heat transfer process of different solvent compositions in ultra-high performance liquid chromatography using thermography*. In Microchemical Journal (Accepted 19th November 2018). <https://doi.org/10.1016/j.microc.2018.11.037>
- A8) S. Mandal, S. Suriyanarayanan, I. A. Nicholls and K. Ramanujam. *Selective Sensing of the Biotinyl Moiety Using Molecularly Imprinted Polyaniline Nanowires*. Journal of The Electrochemical Society, 165 (14) B669-B678 (2018). <http://jes.ecsdl.org/content/165/14/B669>

Reviewed Lectures at international conferences made with KKS BIO-QC support and thus also thanked in Acknowledgements with grant number at last slide. Presenting author is underlined.

- L1) HPLC 2018 47th International Symposium & Exhibit on High Performance Liquid Phase Separations and Related Techniques. July 29-August 2, Washington DC. Session: Oligomers, L-145) (Session FUN 11, Fun1101-We) *On the Issue of Separating*

Diastereomers of Phosphorothioated Oligonucleotides. Martin Enmark, Jörgen Samuelsson, Maria Rova, Eivor Örnkov, Anders Karlsson, Torgny Fornstedt.

- L2) PREP 2018, 31st International Symposium on Preparative and Process Chromatography. July 8-11, Baltimore, MD USA. (L-204) *Increasing the Robustness of SFC: Examples from Chiral and Peptide Separations.* Torgny Fornstedt, Martin Enmark, Emelie Glenne, Marek Lesko, Annika Weinmann, Tomas Leek, Krzysztof Kaczmarek, Magnus Klarqvist, Jorgen Samuelsson.
- L3) SFC 2018 – Strasbourg, France, October 17-19 the 12th International Conference on Packed Column SFC. *Investigation of robustness for supercritical fluid chromatography separation of peptides: Isocratic vs gradient mode.* Martin Enmark, Jörgen Samuelsson, Emelie Glenne, Marek Lesko, Annika Weinmann, Tomas Leek, Krzysztof Kaczmarek, Magnus Klarqvist, Torgny Fornstedt.
- L4) SPICA 2018 17th International Symposium on Preparative and Industrial Chromatography and Allied Techniques Darmstadt, Germany October 7-10. (OC25) *Studies on Robustness of SFC: Examples from Chiral and Peptide Separations.* By Torgny Fornstedt, Jörgen Samuelsson, Emelie Glenne, Hanna Leek, Kristina Öhlén, Magnus Klarqvist, Patrik Forssén, Torgny Fornstedt.
- L5) MIP-2018 in Jerusalem, 24-28 June 2018, Jerusalem, Israel. Biomimetic Polymers. *Hierarchical imprinted polymer architectures.* By I.A. Nicholls.

Posters at international conferences made with KKS BIO-QC support and acknowledged in the poster with the correct grant number (Dnr). Presenting author is underlined.

- P1) HPLC 2018 47th International Symposium & Exhibit on High Performance Liquid Phase Separations and Related Techniques. July 29-August 2, Washington DC. (P-T-1302) *Why Gradient Elution Lead to Increased Robustness of SFC Separations.* Martin Enmark, Emelie Glenne, Marek Lesko, Annika Langborg Weinmann, Tomas Leek, Krzysztof Kaczmarek, Magnus Klarqvist, Torgny Fornstedt, Jörgen Samuelsson.
- P2) HPLC 2018 47th International Symposium & Exhibit on High Performance Liquid Phase Separations and Related Techniques. July 29-August 2, Washington DC. (P-T-1303) *Highlighting often Neglected Experimental Parameters in Analytical Supercritical Fluid Chromatography.* Martin Enmark, Jörgen Samuelsson, Anders Karlsson, Torgny Fornstedt.
- P3) HPLC 2018 47th International Symposium & Exhibit on High Performance Liquid Phase Separations and Related Techniques. July 29-August 2, Washington DC. (P-W-1717) *Diastereomer Separation of Phosphorothioated Oligonucleotides.* Martin Enmark, Jörgen Samuelsson, Maria Rova, Eivor Örnkov, Anders Karlsson, Torgny Fornstedt.
- P4) PREP 2018, 31st International Symposium on Preparative and Process Chromatography. July 8-11, Baltimore, MD USA. (P-M-138) *Proper Operational Conditions in Supercritical Fluid Chromatography of Complex Molecules, Set vs. Real Conditions.* Torgny Fornstedt, Martin Enmark, Jörgen Samuelsson, Anders Karlsson.
- P5) PREP 2018, 31st International Symposium on Preparative and Process Chromatography. July 8-11, Baltimore, MD USA. (P-T-239) *Robust Operation of SFC using Peptide and Chiral Model Systems.* Torgny Fornstedt, Martin Enmark, Emelie Glenne, Marek Lesko, Annika Langborg Weinmann, Tomas Leek, Krzysztof Kaczmarek, Magnus Klarqvist, Jörgen Samuelsson.
- P6) PREP 2018, 31st International Symposium on Preparative and Process Chromatography. July 8-11, Baltimore, MD USA. (P-T-240) *Separation of Phosphorothioated Oligonucleotides and their Diastereomers.* Torgny Fornstedt, Martin

Enmark, Jörgen Samuelsson, Maria Rova, Eivor Örnkov, Anders Karlsson, Torgny Fornstedt.

- P7)** SPICA 2018 17th International Symposium on Preparative and Industrial Chromatography and Allied Techniques Darmstadt, Germany October 7-10. Investigations of robustness in SFC. By Torgny Fornstedt, Martin Enmark, Emelie Glenne, Marek Leško, Annika Langborg Weinmann, Tomas Leek, Krzysztof Kaczmarek, Magnus Klarqvist, Hanna Leek, Jörgen Samuelsson.
- P8)** SPICA 2018 17th International Symposium on Preparative and Industrial Chromatography and Allied Techniques Darmstadt, Germany October 7-10. Evaluation of using Instrumental-Set Conditions vs. Real Operation Conditions in Supercritical Fluid Chromatography. By Torgny Fornstedt, Martin Enmark, Jörgen Samuelsson, Anders Karlsson.
- P9)** SFC 2018 – Strasbourg, France October 17-19, 2018, the 12th International Conference on Packed Column SFC. Investigation of robustness for supercritical fluid chromatography separation of peptides: Isocratic vs gradient mode. Martin Enmark, Emelie Glenne, Marek Leško, Annika Weinmann, Tomas Leek, Krzysztof Kaczmarek, Patrik Forssén, Magnus Klarqvist, Torgny Fornstedt and Jörgen Samuelsson.
- P10)** Biosensors 2018, 12-15 June 2018, Miami, USA. N. Ndizeye, S. Suriyanarayanan, T. Aastrup I.A., Nicholls.

Technical Presentations - at Industrial & Instrumental Events

- T1)** North American Kromasil Prep Symposium 2018, Boston, MA, USA, may 21st 2018: (Application presentation: Oligonucleotides - knowledge building, early results. Dr. Per Jageland (AkzoNobel) with courtesy of Martin Enmark (Karlstad University) <https://www.kromasil.com/events/NAKPS18/>)
- T2)** Improved predications of drug efficacy. In Life Sci – Biotechnology (2018) 52-53. By Samuel Altun, Patrik Forssén and Ian A. Nicholls. The paper describes how the analysis of experimental results can be improved and visualized using new mathematical algorithms; the project aims at within five years provide new analytical tools that more accurately and in a simplified manner describe the complexity of the interactions between drug molecules and their receptors in the body. (link: <http://news.cision.com/attana/r/a-new-scientific-publication-suggests-improved-predictions-of-drug-efficacy-based-on-a-new-analytica.c2486086>)
- T3)** Oligonucleotide separations with Kromasil RP phases, Chromatography Today, December 12 2018 <https://www.chromatographytoday.com/news/hplc-uhplc/31/kromasil/oligonucleotide-separations-with-kromasil-rp-phases/47856> (Accessed March 12 2019)
- T4)** Emerging Separations Technologies (2019) 28th March 2019 at RCS Burlington House, London, UK. Novel separation methods of polynucleotides, presented by Eivor Örnkov. <https://chromsoc.com/wp-content/uploads/2018/05/chromsoc-est-2019-1.pdf>
- T5)** Agilent Nordic Scientific Forum Gothenburg 2018, 15 – 16 March. Robust Supercritical Fluid Separation of Peptides. By Torgny Fornstedt, Martin Enmark, Emelie Glenne, Marek Leško, Krzysztof, Kaczmarek.

Seminaries, Events, Popular Science articles & Web-based News

- S1)** Kvalitetskontroll: Start för projekt om nästa generations läkemedel. Kemivärlden Biotech med Kemisk Tidskrift, nr. 8, December 2017 (av B. Jönsson).

<http://www.fssg.se/wp-content/uploads/2018/01/KK-kickoff-Kemiv%C3%A4rlden-2017.pdf>

- S2) Forskning - en god affär för Sverige? Frukostseminarium på IVA den 8 november 2018.** På seminariet diskuterades bland annat hur universiteten och högskolorna som ligger i framkant arbetar med kunskapsöverföring & vilka samarbetsformer som fungerar bäst. Medverkande: bl. a Teodor Aastrup, CEO på Attana AB, Ulf Hall, tillförordnad vd, KK-stiftelsen och Johan Sterte, Rektor, Karlstads universitet. <https://www.iva.se/event/forskning-en-god-affar-for-sverige/>
- S3)** Stort anslag till kvalitetskontroll av nästa generations läkemedel. Projektet "BIO-QC: Kvalitetskontroll och rening av nya biologiska läkemedel", har beviljats anslag av KK-stiftelsen. Med en budget på över 20 miljoner kronor samlar projektet ledande kompetens från både akademi och industri. Under ledning av professor Torgny Fornstedt vid Karlstads universitet kommer dessa samarbete för att säkerställa Sveriges ledande position inom läkemedelsforskning och utveckling (publicerat 2017-06-20). <https://www.kau.se/index.php/nyheter/stort-anslag-till-kvalitetskontroll-av-nasta-generations-lakemedel>
- S4)** 20 miljoner till forskning om kvalitetskontroll av läkemedel. Ett nytt forskningsprojekt, som fått medel från KK-stiftelsen, ska utveckla kvalitetskontrollen av läkemedel. Örebro universitet deltar i projektet tillsammans med Karlstads universitet, Linnéuniversitetet och flera företag (publicerat 27 juni 2017) <https://www.oru.se/nyheter/nyhetsarkiv/nyhetsarkiv-2017/20-miljoner-till-forskning-om-kvalitetskontroll-av-lakemedel/>.
- S5)** Årets bästa doktorsavhandling inom läkemedelsanalys. *Årets bästa doktorsavhandling inom läkemedelsanalys går till Dennis Åsberg, doktorand vid Karlstads universitet. Priset delas ut av Apotekarsocieteten den 21 november på Lunds universitet.* <https://www.kau.se/nyheter/arets-basta-doktorsavhandling-inom-lakemedelsanalys> (Publicerat 2017-11-22).
- S6)** Kvalitetskontroll av nästa generations läkemedel. *Den 30 november var det kick-off för projekt BIO-QC, Kvalitetskontroll och rening av nya biologiska läkemedel, vars syfte är att utveckla förbättrade metoder för kvalitetskontroll av nästa generations läkemedel. Projektet involverar tre akademiska grupper och fyra företag* (Publicerat 2017-12-04). <https://www.kau.se/nyheter/kvalitetskontroll-av-nasta-generations-lakemedel>
- S7)** Bättre metoder för kvalitetskontroll av nästa generations läkemedel. Nästa generations läkemedel baseras på stora biologiska molekyler och kommer att kräva nya typer av kvalitetskontroller. Ett projekt som involverar tre universitet och fyra företag har just dragit igång för att utveckla nya tekniker för dessa kontroller. (Publicerat 2018-01-25). <https://lnu.se/mot-linneuniversitetet/aktuellt/nyheter/2018/battre-metoder-for-kvalitetskontroll-av-nasta-generations-lakemedel/>
- S8)** Project: Quality Control and Purification for New Biological Drugs (BIO-QC). Projektet BIO-QC ska utveckla nya material och processer för kvalitetskontroll av läkemedel som baseras på så kallade biomolekyler. <https://lnu.se/forskning/sok-forskning/forskningsprojekt/projekt-quality-control-and-purification-for-new-biological-drugs-bio-qc/>
- S9) AstraZeneca tränar studenter på realistiska frågeställningar.** *I höstas sjosattes en C- och D-kurs, Produkters kemi, vid Karlstads universitet. Kursens syfte är att förmedla yrkesförberedande kunskaper om moderna produktionsprocesser såsom produkters livscykel från ett hållbart perspektiv. Bland annat genomfördes en temadag där Anders Karlsson från AstraZeneca medverkade.* (Publicerat 2018-01-24). <https://www.kau.se/nyheter/astrazeneca-tranar-studenter-pa-realistiska-fragestallningar>

- S10)** A new scientific publication suggests improved predictions of drug efficacy based on a new analytical method of cell-based experiments. *The paper T2, here showcased at the Company Attana AB homepage.* <https://news.cision.com/attana/r/a-new-scientific-publication-suggests-improved-predictions-of-drug-efficacy-based-on-a-new-analytica.c2486086> (Published TUE, APR, 2018 09:16 CET)
- S11)** Annual Workshop Network in Pure and Applied Analysis (NPAA), Örebro, 15 April 2019 T135, Teknikhuset. 13:00-13:30 Marek Szymanski (Örebro University) - Inverse problems in pharmaceutical research: protein purification and protein-biosensor interactions. <https://www.oru.se/kalendarium/ovriga-evenemang/npaa-workshop/>