# Curriculum vitae

**Name, Date of birth:** Christoph Langhammer, 1978-09-22 in Zürich, Switzerland

**Affiliation:** Associate Professor at Chalmers University of Technology

**Marital Status:** Married to Elin Larsson Langhammer.
**Children:** Noël (born 2013), Felix (born 2015), approximately 5 months of paternity leave (2014).

## Summary

I was born in Zürich, Switzerland, and obtained a Master in Materials Science from ETH Zürich in 2004. After my PhD at Chalmers in 2009, I started the spin-off Insplorion AB. I was appointed assistant professor in 2010 and associate professor in 2015. During this period, I have successfully built an internationally recognized research group operating at the interface between materials science, nanoscience, plasmonics and catalysis, with focus on sustainable energy-related materials and processes. We also continuously build our own research instrumentation.

## Education and degrees

2013 – Appointed "Oavlönad Docent" at Chalmers University of Technology
2009 – PhD in Materials Science at Chalmers University of Technology
2004 – Master Degree in Materials Science at Swiss Federal Institute of Technology (ETHZ).

## Current and previous positions

*Associate Professor (March 1st 2015 onwards):*
Chalmers University of Technology, Department of Applied Physics.

*Assistant Professor (January 1st 2011 – February 2015):*
Chalmers University of Technology, Department of Applied Physics.

*Post-doctoral Fellow (November 1st 2009 - December 31st 2010):*
Chalmers University of Technology, Department of Applied Physics. Advisor: Prof. Bengt Kasemo.

*Chief Science Officer, CSO (2010- onwards):*
Insplorion AB, Medicinaregatan 8A, SE-413 90 Göteborg, Sweden.

## Distinctions, scholarships and awards

**2015:** ERC Starting Grant – "SINCAT", 1.5 M €.
**2015:** Knut and Alice Wallenberg Foundation project grant, 35,9 M SEK.
**2015:** Last and corresponding author of Nature Materials publication (doi:10.1038/nmat4409).
**2014:** Recipient of Swedish Research Council "Unga Forskare " grant (4.1 M SEK).
**2012:** Chalmers Area of Advance Prize for excellence in performed scientific work, teaching and exploitation of science through a spin-off company (100 k SEK).
**2011:** Winner of the Swedish Cleantech Business Award with Insplorion AB.
**2010:** Stipend from HM King Carl XVI Gustaf's foundation (125k SEK).
**2010:** Recipient of Swedish Research Council "Forskarassistent" grant (6.5 M SEK).
**2009:** 3rd place at Venture Cup West with commercialization project "Clean Sense".

## Supervising experience

Supervisor of 8 PhD students since 2011, whereof main supervisor for 5. Advisor of 4 post docs. Supervisor and examiner of a total of 15 master thesis projects. These theses have been produced:
**2015:** Examiner/main supervisor: Carl Wadell (PhD), David Johansson (master), David Albinsson (master).

**2014:** Examiner/main-/co-supervisor: Viktoria Gusak (PhD), Francesco Mazzotta (PhD), Kristina Wettergren (PhD), Pooya Tabib Zadeh Adibi (licenciate), Svetlana Syrenova (licenciate), Jenny Andersson (master), Mattias Fredriksson (master), Emmanuel Nkurunziza (master), Emil Lidström (master).
**2013:** Examiner/co-supervisor for Zhaleh Pirzadeh (licenciate), Johan Hagberg (master), Farzin Jahangiri (master).
**2012:** Examiner/co-supervisor for Carl Wadell (licenciate) Ferry Nugroho (master), Svetlana Syrenova (master).
**2011:** Examiner/supervisor Ugo Sassi (master), Tobias Moberg (master), Julien Millet (master).

## Teaching experience

Examiner of master course "Energy Related Materials" (7,5 ECTS), which I developed in 2012. Examiner of master course "Surface and Nanophysics" (7.5 ECTS). Teacher in master course "Nanoscience" (7,5 ECTS).
Attended courses in pedagogy, supervision and research ethics and completed a diploma in higher education, total 15 ECTS. Attended a 9-day academic leadership course for assistant professors at Chalmers 2011/2012.

## National and international assignments of importance

**2015 onwards:** Member of Strategic Reference group of the Chalmers Materials Analysis Laboratory
**2014 onwards:** Member of surface analysis expert group of the Chalmers Materials Analysis Laboratory.
**2014:** Member of PhD evaluation committee for Erik Martinsson (LiU).
**2013:** Member of PhD evaluation committee for Chunze Yuan (KTH).
**2011 onwards:** Regular reviewer for ACS, RSC, Nature Publishing group and Wiley.
**Since 2011:** A total of 12 invited oral keynote conference presentations.

## Innovation and outreach activities

Co-founder and CSO for the spin-off company Insplorion AB (org. number 556798-8760), founded in 2010 in collaboration with the Chalmers School of Entrepreneurship. I was the driving force behind the development of the company technology and responsible for all IPR issues, as well as actively involved in sales and marketing processes. Insplorion has to date seven employees and has attracted 38 MSEK in venture capital and is now listed at "AktieTorget".
Lecturer in IVA's and KVA's continued education day organized at Swedish Science Centres for high-school teachers on the topic of the sustainable energy challenge..

## Total scientific production

**53** peer-reviewed publications (+3 currently under review) with a total of **1506** citations and an h-index of **17** according to *Web of Science,* and a total of **1863** citations and h-index of **18** according to *Google Scholar* by 2015-11-24. I was lead author on **10**, last author on **22,** and corresponding author on **36**, respectively. First author indicates effectuation of experiments and writing the first draft of the paper. Last author and/or corresponding author indicates main project responsibility, being idea provider and that I in many cases also wrote the first draft of the paper. A fraction **close to 50%** of my papers are published in journals with **high impact factor** (**1** Nature Materials – Impact: 36.54, **1** Science – Impact: 31.48, **11** Nano Lett. – 12.94, **3** Adv. Mater. – 15.41, **2** ACS Nano – 12.03, **1** Energy & Environmental Science – 15.49, **2** Phys. Rev. Lett. – 7.73 and **3** ACS Catalysis – 7.56). Together with my students have given a total of **41** peer-reviewed oral international conference talks, and I have presented **12** invited keynote lectures. My work has resulted in **6 patent applications**, **3** registered trade marks with Insplorion AB, **4** invited review articles, **2** book chapters, and was highlighted **5** times, whereof twice in a Nature journal

# Publications by 2015-11-24

## Overview of publication records

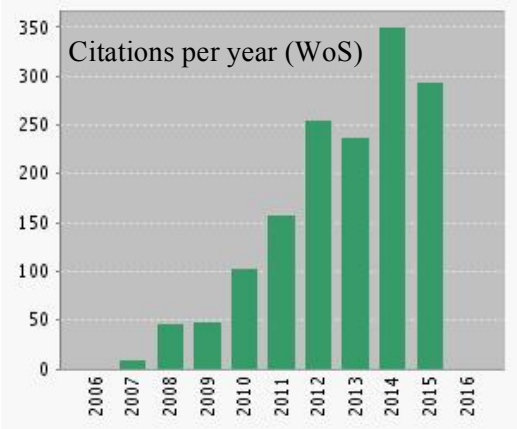
| | |
|---|---|
| **No. of publications:** | ***53 (+3 under review) WoS*** |
| **Total no. of citations:** | ***1506 WoS, 1863 Google Scholar*** |
| **Hirsch index:** | ***17 WoS, 18 Google Scholar*** |

## Summary

I have co-authored 24 publications (46 % of total production) in **high-impact** journals:

- 1 in *Nature Materials* (36.54)
- 1 in *Science* (33.61)
- 11 in *Nano Letters* (13.64)
- 3 in *Advanced Materials* (15.409)
- 2 in *ACS Nano* (12.88)
- 1 in *Energy and Environmental Science* (20.52)
- 3 in *ACS Catalysis* (9.31572)
- 2 in *Physical Review Letters* (7.51)

[2014 ISI Journal Impact Factor in brackets].

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## Peer-reviewed publications

Note about the **author sequence** of peer-reviewed publications in my field of science: First author indicates that I effectuated the key experiments and wrote the first draft of the paper. Last author and/or corresponding author indicates that I had main project responsibility, was idea provider and project coordinator, and that I in many cases also wrote the first draft of the paper.

### JOURNAL PAPERS

The **ten most important publications** are marked with *.

1. Nugroho, F.A.A., Iandolo, B., Wagner J.B. & Langhammer, C. Bottom-Up Nanofabrication of Supported Noble Metal Alloy Nanoparticle Arrays for Nanoplasmonics and Hydrogen Sensing. ***Invited paper in Emerging Investigator Special Issue, Journal of Materials Chemistry A***, in press (2015).

2. Nugroho, F.A.A., Xu, C., Hedin, N. & Langhammer, C. UV-vis and Plasmonic Nano-Spectroscopy of the CO2 Adsorption Energetics in a Microporous Polymer. ***Analytical Chemistry***, 87 (20), 10161–1016 (2015). **DOI:** 10.1021/acs.analchem.5b03108

3. Syrenova, S., Wadell, C., Nugroho F. A. A., Gschneidtner T. A., Diaz Fernandez, Y. A., Nalin G., Switlik, D., Westerlund, F., Antosiewicz, T. J., Zhdanov, V. P., Moth-Poulsen, K.

& Langhammer, C. Hydride Formation Thermodynamics and Hysteresis in Individual Pd Nanocrystals with Different Size and Shape. ***Nature Materials***, 14, 1236–1244 (2015). **DOI**:10.1038/nmat4409*

4. Antosiewicz, T. J., Wadell, C. & Langhammer, C. Plasmon-Assisted Indirect Light Absorption Engineering in Small Transition Metal Catalyst Nanoparticles. ***Advanced Optical Materials***, 3, 1591-1599 (2015). **DOI:** 10.1002/adom.201500284

5. Wickman, B., Fredriksson, M., Feng L., Lindahl, N., Hagberg, J. & Langhammer C. Depth Probing of the Hydride Formation Process in Thin Pd Films by Combined Electrochemistry and Fiber Optics-Based in situ UV/vis Spectroscopy. ***PCCP***, 17, 18953 – 18960 (2015). **DOI:** 10.1039/C5CP01339A

6. Wadell, C. & Langhammer, C. Drift-Corrected Nanoplasmonic Hydrogen Sensing by Polarization. ***Nanoscale***, 7, 10963-10969 (2015). **DOI:** 10.1039/C5NR01818H

7. Wadell, C., Nugroho F.A.A., Lidström, E., Iandolo, B., Wagner, J.B. & Langhammer, C. Hysteresis-Free Nanoplasmonic Pd-Au Alloy Hydrogen Sensors. ***Nano Letters***, 15, 3563-3570 (2015). **DOI:** 10.1021/acs.nanolett.5b01053*

8. Zhdanov, V.P., Schweinberger, F.F., Heiz, U. & Langhammer, C. Ostwald Ripening of Supported Pt Nanoclusters with Initial Size-Selected Distributions. ***Chemical Physics Letters***, 631-632, 21-25 (2015). **DOI:**10.1016/j.cplett.2015.04.037

9. Tabib Zadeh Adibi, P., Zhdanov, V.P., Langhammer, C. & Grönbeck, H. Transient Bimodal Particle Size Distributions During Pt Sintering on Alumina and Silica. ***Journal of Physical Chemistry C***, 119 (2), 989–996 (2015). **DOI:** 10.1021/jp506586g

10. Wettergren, K., Hellman, A., Cavalca, F., Zhdanov, V.P., & Langhammer, C. Unraveling the Dependence of Hydrogen Oxidation Kinetics on the Size of Pt Nanoparticles by in operando Nanoplasmonic Temperature Sensing. ***Nano Letters***, 15 (1), 574-580 (2015). **DOI:** 10.1021/nl504042u

11. Tabib Zadeh Adibi, P., Mazzotta, F., Antosiewicz, T.J., Skoglundh, M., Grönbeck, H. & Langhammer, C. In situ Plasmonic Sensing of Platinum Model Catalyst Sintering on Different Oxide Supports and in O2 and NO2 Atmospheres with Different Concentrations. ***ACS Catalysis***, 5 (1), 426-432 (2015). **DOI:** 10.1021/cs5015173

12. Wadell C., Syrenova S. & Langhammer C. Plasmonic Hydrogen Sensing with Nanostructured Metal Hydrides. ***ACS Nano***, 8 (12), 11925–11940 (2014). **DOI:** 10.1021/nn505804f

13. Wettergren K., Schweinberger F.F., Deiana D., Ridge C.J., Crampton A.S., Rötzer M., Hansen T.W., Zhdanov V.P., Heiz. U. & Langhammer C. High Sintering Resistance of Size-Selected Platinum Cluster Catalysts by Suppressed Ostwald Ripening. ***Nano Letters*** 14 (10), 5803–5809 (2014). DOI:10.1021/nl502686u*

14. Diaz Fernandez Y.A., Gschneidtner T., Wadell C., Fornander L.H., Lara-Avila S., Langhammer C., Westerlund F. & Moth-Poulsen K. The Conquest of Middle-Earth: combining top-down and bottom-up nanofabrication for constructing nanoparticle based devices. ***Nanoscale***, 6, 14605-14616 (2014). DOI:10.1039/C4NR03717K

15. Gusak V., Nkurunziza E., Langhammer C., Kasemo B. Real Time Adsorption and Desorption Kinetics of Dye Z907 on a Flat Mimic of Dye-Sensitized Solar Cell TiO2 Photoelectrodes. The ***Journal of Physical Chemistry C*** 118 (30), 17116–17122 (2014). DOI: 10.1021/jp5015274

16. Wadell, C., Pingel, T., Olsson, E., Zoric, I., Zhdanov, V.P. & Langhammer, C. Thermodynamics of Hydride Formation and Decomposition in sub-10 nm Pd Nanoparticles of Different Sizes. ***Chemical Physics Letters*** 603, 75-81 (2014). DOI: 10.1016/j.cplett.2014.04.036

17. Syrenova, S., Wadell, C. & Langhammer C. Shrinking-Hole Colloidal Lithography: Self-Aligned Nanofabrication of Complex Plasmonic Nanoantennas. ***Nano Letters***, 14 (5), 2655-2663 (2014). DOI: 10.1021/nl500514y*

18. Gschneidtner, T., Diaz-Fernandez, Y.A., Syrenova, S., Westerlund, F., Langhammer, C. & Moth-Poulsen, K. A Versatile Self-Assembly Strategy for the Synthesis of Shape-Selected Colloidal Noble Metal Nanoparticle Heterodimers. ***Langmuir***, 30 (11), 3041–3050 (2014). DOI: 10.1021/la5002754

19. Pirzadeh, Z., Pakizeh, T., Miljkovic, V., Langhammer, C., Dmitriev, A. Plasmon-Interband Coupling in Nickel Nanoantennas. ***ACS Photonics*** 1(3) 158-162 (2014). DOI:10.1021/ph4000339

20. Gusak, V., Heiniger, L.-P., Zhdanov, V.P., Graetzel, M., Kasemo, B. & Langhammer, C. Diffusion and Adsorption of Dye Molecules in Mesoporous TiO2 Photoelectrodes Studied by Indirect Nanoplasmonic Sensing. ***Energy & Environmental Science*** 6 (12), 3627-3636 (2013). DOI: 10.1039/C3EE42352B*

21. Schwind, M., Hosseinpour, S., Langhammer, C., Zorić, I., Leygraf, C. & Kasemo, B. Nanoplasmonic Sensing for Monitoring the Initial Stages of Atmospheric Corrosion of Cu Nanodisks and Thin Films. ***Journal of The Electrochemical Society*** 160 (10), C487–C492 (2013). DOI: 10.1149/2.051310jes

22. Müller, M., Jung, U., Gusak, V., Ulrich, S., Holz, M., Herges, R., Langhammer, C., and Magnussen O.M. ***Langmuir*** 29 (34), 10693–10699 (2013). DOI: 10.1021/la401825f

23. Yoshimura, K., Langhammer, C. & Dam, B. Metal Hydrides for Smart Window and Sensor Applications. ***MRS Bulletin*** 38 (06) 495–503 (2013). DOI: 10.1557/mrs.2013.129

24. Schwind, M., Hosseinpour, S., Johnson, C.M., Langhammer, C., Zorić, I., Leygraf, C. & Kasemo, B. Combined in Situ Quartz Crystal Microbalance with Dissipation Monitoring, Indirect Nanoplasmonic Sensing, and Vibrational Sum Frequency Spectroscopic Monitoring

of Alkanethiol-Protected Copper Corrosion. ***Langmuir*** 29 (23), 7151–7161 (2013). DOI: 10.1021/la4009224

25. Frost, R., Norström, E., Bodin, L., Langhammer, C., Sturve, J., Wallin, M. & Svedhem, S. Acoustic Detection of Melanosome Transport in Xenopus Laevis Melanophores. ***Analytical Biochemistry*** 435 (1), 10–18 (2013). DOI: 10.1016/j.ab.2012.12.004

26. Cavalca, F., Hansen, T.W., Wagner, J.B., Langhammer, C., Pedersen, T., Dahl, S. In situ light spectroscopy in the environmental transmission electron microscope (ETEM). ***Microscopy and Microanalysis*** 18 (S2), 1184-1185 (2o12). DOI:10.1017/S1431927612007775

27. Larsson, E.M., Syrenova, S. & Langhammer, C. Nanoplasmonic Sensing for Nanomaterials Science. Invited review. ***Nanophotonics*** 1, 249-266 (2012). DOI: 10.1515/nanoph-2012-0029

28. Antosiewicz, T.J., Apell, P.S., Zäch, M., Zorić, I. & Langhammer, C. Oscillatory Optical Response of an Amorphous two-dimensional Array of Gold Nanoparticles. ***Physical Review Letters*** 109 (24), 247401 (2012). DOI: 10.1103/PhysRevLett.109.247401*

29. Langhammer, C., Larsson, E.M., Zhdanov, V.P. & Zoric, I. Asymmetric Hysteresis in Nanoscopic Single-Metal Hydrides: Palladium Nanorings. ***The Journal of Physical Chemistry C*** 116, 21201–21207 (2012). DOI: 10.1021/jp3059273

30. Antosiewicz, T.J., Apell, S.P., Wadell, C. & Langhammer, C. Absorption Enhancement in Lossy Transition Metal Elements of Plasmonic Nanosandwiches. ***The Journal of Physical Chemistry C*** 116, 20522−20529 (2012). DOI: 10.1021/jp306541n

31. Wadell, C., Antosiewicz, T.J. & Langhammer, C. Optical Absorption Engineering in Stacked Plasmonic Au-SiO2-Pd Nanoantennas. ***Nano Letters*** 12, 4784–4790 (2012). DOI: 10.1021/nl3022187*

32. Zhdanov, V.P., Larsson, E.M. & Langhammer, C. Novel Aspects of Ostwald Ripening of Supported Metal Nanoparticles. ***Chemical Physics Letters*** 533, 65-69 (2012). DOI: 10.1016/j.cplett.2012.03.010

33. Gusak, V., Heiniger, L.-P., Graetzel, M., Langhammer, C. & Kasemo, B. Time-Resolved Nanoplasmonic Internal Interface Spectroscopy of Dye Molecule Adsorption on Dense and Mesoporous TiO2 Films Nano Letters 12, 2397–2403 (2012). DOI: 10.1021/nl3003842

34. Shegai, T., Johansson, P., Langhammer, C. & Kall, M. Directional Scattering and Hydrogen Sensing by Bimetallic Pd-Au Nanoantennas. ***Nano Letters*** 12, 2464–2469 (2012). DOI: 10.1021/nl300558h

35. Larsson, E.M., Millet, J., Gustafsson, S., Skoglundh, M., Zhdanov, V.P. & Langhammer, C. Real Time Indirect Nanoplasmonic in situ Spectroscopy of Catalyst Nanoparticle Sintering. ***ACS Catalysis*** 2, 238-245 (2012). DOI: 10.1021/cs200583u

36. Langhammer, C. & Larsson, E.M. Nanoplasmonic in situ Spectroscopy for Catalysis Applications. ***ACS Catalysis*** 2, 2036–2045 (2012). DOI: 10.1021/cs300423a

37. Zoric, I., Zäch, M., Kasemo, B. & Langhammer, C. Gold, Platinum, and Aluminum Nanodisk Plasmons: Material Independence, Subradiance, and Damping Mechanisms. ***ACS Nano*** 5, 2535–2546 (2011). DOI: 10.1021/nn102166t*

38. Shegai, T. & Langhammer, C. Hydride Formation in Single Palladium and Magnesium Nanoparticles Studied By Nanoplasmonic Dark-Field Scattering Spectroscopy. ***Advanced Materials*** 23, 4409-4414 (2011). DOI: 10.1002/adma.201101976*

39. Schwind, M., Langhammer, C., Kasemo, B. & Zoric, I. Nanoplasmonic sensing and QCM-D as ultrasensitive complementary techniques for kinetic corrosion studies of aluminum nanoparticles. ***Applied Surface Science*** 257, 5679-5687 (2011). DOI: 10.1016/j.apsusc.2011.01.073

40. Zoric, I., Larsson, E.M., Kasemo, B. & Langhammer, C. Localized Surface Plasmons Shed Light on Nanoscale Metal Hydrides. ***Advanced Materials*** 22, 4628–4633 (2010). DOI: 10.1002/adma.201000973

41. Tejland, P., Langhammer, C. & Andrén, H.-O. On the black oxide colour of zirconium alloys. ***Journal of Nuclear Materials*** 400, 79-83 (2010). DOI: 10.1016/j.jnucmat.2010.02.013

42. Langhammer, C., Zhdanov, V.P., Zoric, I. & Kasemo, B. Size-Dependent Kinetics of Hydriding and Dehydriding of Pd Nanoparticles. ***Physical Review Letters*** 104, 135502 (2010). DOI: 10.1103/PhysRevLett.104.135502

43. Langhammer, C., Zhdanov, V.P., Zoric, I. & Kasemo, B. Size-dependent hysteresis in the formation and decomposition of hydride in metal nanoparticles. ***Chemical Physics Letters*** 488, 62-66 (2010). DOI: 10.1016/j.cplett.2010.01.071

44. Langhammer, C., Larsson, E.M., Kasemo, B. & Zorić, I. Indirect Nanoplasmonic Sensing: Ultrasensitive Experimental Platform for Nanomaterials Science and Optical Nanocalorimetry. ***Nano Letters*** 10, 3529-3538 (2010). DOI: 10.1021/nl101727b

45. Pakizeh, T., Langhammer, C., Zoric, I., Apell, P. & Kall, M. Intrinsic Fano Interference of Localized Plasmons in Pd Nanoparticles. ***Nano Letters*** 9, 882-886 (2009). DOI: 10.1021/nl803794h

46. Ohlsson, G., Langhammer, C., Zoric, I. & Kasemo, B. A nanocell for quartz crystal microbalance and quartz crystal microbalance with dissipation-monitoring sensing. ***Review of Scientific Instruments*** 80, 083905 (2009). DOI: 10.1063/1.3202207

47. Larsson, E.M., Langhammer, C., Zorić, I. & Kasemo, B. Nanoplasmonic Probes of Catalytic Reactions. ***Science*** 326, 1091-1094 (2009). DOI: 10.1126/science.1176593*

48. Larsson, E.M., Edvardsson, M.E.M., Langhammer, C., Zoric, I. & Kasemo, B. A Combined Nanoplasmonic and Electrodeless Quartz Crystal Microbalance Setup. ***Review of Scientific Instruments*** 80, 125105 (2009). DOI: 10.1063/1.3265321

49. Langhammer, C., Schwind, M., Kasemo, B. & Zorić, I. Localized Surface Plasmon Resonances in Aluminum Nanodisks. ***Nano Letters*** 8, 1461-1471 (2008). DOI: 10.1021/nl080453i

50. Langhammer, C., Zorić, I., Kasemo, B. & Clemens, B.M. Hydrogen Storage in Pd Nanodisks Characterized with a Novel Nanoplasmonic Sensing Scheme. ***Nano Letters*** 7, 3122-3127 (2007). DOI: 10.1021/nl071664a

51. Langhammer, C., Kasemo, B. & Zoric, I. Absorption and scattering of light by Pt, Pd, Ag, and Au nanodisks: Absolute cross sections and branching ratios. ***Journal of Chemical Physics*** 126 (2007). DOI: 10.1063/1.2734550

52. Fredriksson, H., Alaverdyan, Y., Dmitriev, A., Langhammer, C., Sutherland, D.S., Zaech, M. & Kasemo, B. Hole-Mask Colloidal Lithography. ***Advanced Materials*** 19, 4297-4302 (2007). DOI: 10.1002/adma.200700680

53. Langhammer, C., Yuan, Z., Zoric, I. & Kasemo, B. Plasmonic properties of supported Pt and Pd nanostructures. ***Nano Letters*** 6, 833-838 (2006). DOI: 10.1021/nl060219x

## BOOK CHAPTERS

1. Langhammer, C., Larsson, E.M., Kasemo, B., Zorić, I. *Nanoplasmonic Sensing for Nanomaterials Science and Catalysis.* in ”Nanoplasmonic Sensors”. A. Dmitriev (ed) Springer (2012).

2. Larsson-Langhammer E. M., Syrenova S., Langhammer, C. *Nanoplasmonic Sensing for Nanomaterials Science* in “Photonics Technology and Instrumentation”. D. Andrews (ed.), John Wiley & Sons, Inc., Hoboken, New Jersey. (2015).

## REVIEW ARTICLES

1. Wadell C., Syrenova S. & Langhammer C. Plasmonic Hydrogen Sensing with Nanostructured Metal Hydrides. ***ACS Nano***, 8 (12), 11925–11940 (**2014**). **Invited.**

2. Yoshimura, K., Langhammer, C. & Dam, B. Metal hydrides for Smart Window and Sensor Applications. ***MRS Bulletin*** **38** (06) 495–503 (2013). **Invited.**

3. Larsson, E.M., Syrenova, S. & Langhammer, C. Nanoplasmonic Sensing for Nanomaterials Science in ***Nanophotonics***, **1**, 249-266 (2012). **Invited.**

4. Langhammer, C. & Larsson, E.M. Nanoplasmonic in situ Spectroscopy for Catalysis Applications ***ACS Catalysis***, **2**, 2036–2045 (2012). **Invited.**

## PATENT APPLICATIONS

1. Ohlsson, G., Langhammer, C., Zoric, I., Kasemo, B., *A cell for confinement of very small volumes of soft matter and fluids*: **WO2008039140-A.**
2. Langhammer, C., Larsson, E.M., Zoric, I., Kasemo, B., *Sensing Platforms*: **WO2010136440-A1**. ***2010.***
3. Larsson, E.M., Langhammer, C., Zoric, I., Kasemo, B., *Surface Analytical Tools*: **WO2010130775-A1.**
4. Langhammer, C., Kasemo, B., Zoric, I., Larsson, E. *Sensor Using Localized Surface Plasmon Resonance (LSPR).* Pub. No: **WO/2010/136440**. International Application No.: **PCT/EP2010/057136.**
5. Cavalca, F., Hansen, T.W., Damnsgaard, C.D., Wagner J.B., Pedersen, T., Hansen, O., Langhammer C. *Sample Holder for Electron Microscopy*. **US14/105,752.**
6. Kasemo, B., Nugroho, F, Langhammer C. *A sensor, system and method for sensing a gas*. European Patent Application No **EP13198508.7.**

## POPULAR SCIENCE PUBLICATIONS

1. Langhammer C. Materials challenges: the nanoscience of renewables. Science Omega Review Europe 02, June 2013.
2. Langhammer C. Probing individual functional nanoantennas with optical nanoantenas. Science Omega Review Europe 02, June 2013.
3. Langhammer C. Nanoplasmonics. International Innovation – Euro Focus, March 2013.
4. Langhammer, C. Nanoplasmonic Sensing for Nanomaterials Science and Catalysis. ***SPIE Newsroom.*** (2012). DOI: 10.1117/2.1201205.004244