

dr. Romana Schirhagl  
Assistant Professor  
Department of Biomedical Engineering: General  
E-mail: r.schirhagl@umcg.nl  
Direct phone: +31 627105324



## Research interests

Diamond, Bioanalysis, Magnetometry, Metabolism, Cells, Molecular Imprinting, Imaging

## Working experience

from 2014 University of Groningen University Medical Center Groningen Department of Biomedical Engineering as Tenure Track Assistant Professor leading the Bioimaging and Bioanalysis group  
2011-2013 Postdoc at ETH-Zurich, Physics Department, Degen group  
2010-2011 Postdoc at Stanford University, Chemistry Department, Zare group  
2009-2010 Postdoc at Vienna University, Analytical Chemistry Department, Dickert group  
2007-2009 PhD student at Vienna University, Analytical Chemistry Department, Dickert group

## Education

2007-2009 Bachelor study in Biology at Vienna University (2nd degree not finished)  
2003-2007 Diploma study in Chemistry (equivalent to a Bachelor+Masters finished one year below official minimal time) at Vienna University,  
1995-2003 Grammar school (Bundesrealgymnasium Steyr)

## Activities

### IST Austria institute Colloquium

Romana Schirhagl (Attendee)  
28-Mar-2022

### MRS fall meeting

Romana Schirhagl (Attendee)  
29-Nov-2021 → 2-Dec-2021

### Colloquium at Technische Universität Kaiserslautern

Romana Schirhagl (Attendee)  
28-Sep-2021

### QUANTUM Seminar Wintersemester 2021/22

Romana Schirhagl (Attendee)  
21-Jul-2021

### Optics and Lasers

Romana Schirhagl (Attendee)  
28-Jun-2021

### 2nd International conference on Pharma Industry & pharmaceuticals

Romana Schirhagl (Keynote speaker)  
27-Mar-2021

### COMSATS University (External organisation)

Romana Schirhagl (Reviewer)  
2021

**German Research Foundation (External organisation)**

Romana Schirhagl (Member of board)  
2021

**Hasselt University (External organisation)**

Romana Schirhagl (Advisor)  
2021

**NWO (External organisation)**

Romana Schirhagl (Member of board)  
2021

**NWO (External organisation)**

Romana Schirhagl (Reviewer)  
2021

**Silesian Tech Univ, Silesian University of Technology, Fac Biomed Engn, Dept Biomat & Med Devices Engn (External organisation)**

Romana Schirhagl (Advisor)  
2021

**Sir Henry (Publisher)**

Romana Schirhagl (Peer reviewer)  
2021

**Biointerfaces 2020 conference**

Romana Schirhagl (Attendee)  
25-Aug-2020 → 27-Aug-2020

**External Reviewer**

Romana Schirhagl (Consultant)  
2020 → ...

**External reviewer for PhD thesis**

Romana Schirhagl (Member of Assessment Committee)  
2020 → ...

**External reviewer for PhD thesis**

Romana Schirhagl (Examiner)  
2020 → ...

**Israeli Ministry of Science and Technology for the call "Indian-Israeli joint research cooperation" (External organisation)**

Romana Schirhagl (Reviewer)  
2020

**Periyar University India (External organisation)**

Romana Schirhagl (Reviewer)  
2020

**Sonderforschungsbereich (SFB) (External organisation)**

Romana Schirhagl (Member)  
2020 → 2021

**Sonderforschungsbereich (SFB) (External organisation)**

Romana Schirhagl (Member)  
2020 → 2021

**The University of Melbourne (External organisation)**

Romana Schirhagl (Reviewer)  
2020

**Diamond magnetometry in a cell**

Romana Schirhagl (Speaker)  
16-Sep-2019 → 19-Sep-2019

**PhD Day 2019**

Romana Schirhagl (Invited speaker)  
20-Jul-2019

**Diamond and Single Photon Emitters**

Romana Schirhagl (Speaker)  
23-Jun-2019 → 28-Jun-2019

**Imaging with Nanodiamond Probes**

Romana Schirhagl (Keynote speaker)  
19-Jun-2019 → 21-Jun-2019

**UMCG bouwt brug**

Romana Schirhagl (Speaker)  
19-May-2019

**WE-Heraeus Seminar**

Romana Schirhagl (Speaker)  
25-Mar-2019 → 28-Mar-2019

**External adviser for PhD thesis**

Romana Schirhagl (Consultant)  
1-Jan-2019 → 31-Dec-2019

**External adviser for tenure track evaluations**

Romana Schirhagl (Consultant)  
1-Jan-2019 → 31-Dec-2019

**Frontiers in Physics (Journal)**

Romana Schirhagl (Editorial board member)  
1-Jan-2019 → 31-Dec-2019

**Nanomaterials (Basel, Switzerland) (Journal)**

Romana Schirhagl (Editorial board member)  
1-Jan-2019 → 31-Dec-2019

**NWO grants ENW KLEIN (External organisation)**

Romana Schirhagl (Member)  
1-Jan-2019 → 31-Dec-2019

**Proposal reviewer**

Romana Schirhagl (Consultant)  
1-Jan-2019 → 31-Dec-2019

**Proposal reviewer**

Romana Schirhagl (Consultant)  
1-Jan-2019 → 31-Dec-2019

**Proposal reviewer**

Romana Schirhagl (Consultant)  
1-Jan-2019 → 31-Dec-2019

**Proposal reviewing for GSMs PhD call**

Romana Schirhagl (Consultant)  
1-Jan-2019 → 31-Dec-2019

**Reviewer**

Romana Schirhagl (Consultant)  
1-Jan-2019 → 31-Dec-2019

**ZonMW grants for the call Enabling Technologies Hotels (External organisation)**

Romana Schirhagl (Member)  
1-Jan-2019 → 31-Dec-2019

**Rosalind Franklin Univ Med & Sci (External organisation)**

Romana Schirhagl (Member)  
2019 → ...

**W.J. Kolff Institute for Biomedical Engineering and Materials Science (KOLFF) (Organisational unit)**

Romana Schirhagl (Member)  
2019 → ...

**Micro ESR: On chip magnetic resonance spectroscopy of microliter samples**

Romana Schirhagl (Keynote speaker)  
14-Aug-2018

**DFG proposal reviewer**

Romana Schirhagl (Consultant)  
1-Jan-2018 → 31-Dec-2018

**Dutch FOM (Dutch Physics Association) Projectruimte Grants (External organisation)**

Romana Schirhagl (Member)  
1-Jan-2018 → 31-Dec-2018

**Award committee International Conference on Diamond and Carbon Materials Series (External organisation)**

Romana Schirhagl (Member)  
2018

**Charles University**

Romana Schirhagl (Visiting researcher)  
2018

**Department of Chemistry, Stanford University, Stanford, California, USA**

Romana Schirhagl (Visiting researcher)  
2018

**Department of Physics, University of California, Santa Barbara, USA**  
Romana Schirhagl (Visiting researcher)  
2018

**Empa, Swiss Federal Laboratories for Materials Science & Technology (EMPA), Swiss Fed Labs Mat Sci & Technol, Lab Protect & Physiol**  
Romana Schirhagl (Visiting researcher)  
2018

**External adviser for PhD thesis Charles University in Prague**  
Romana Schirhagl (Advisor)  
2018

**Max Planck Society, Frankfurt, Germany**  
Romana Schirhagl (Visiting researcher)  
2018 → ...

**Proposal reviewer for German grant institution DFG**  
Romana Schirhagl (Advisor)  
2018

**Technical University of Munich (TUM)**  
Romana Schirhagl (Visiting researcher)  
2018

**External reviewer**  
Romana Schirhagl (Consultant)  
1-Jan-2017 → 31-Dec-2017

**External reviewer for the Czech Science Foundation (GACR).**  
Romana Schirhagl (Advisor)  
2017 → 2018

**Hasselt Diamond Workshop (External organisation)**  
Romana Schirhagl (Member)  
2017 → ...

**Hasselt Diamond Workshop (External organisation)**  
Romana Schirhagl (Member)  
2017 → ...

**External adviser**  
Romana Schirhagl (Consultant)  
1-Jan-2016 → 31-Dec-2016

**Chemical Society Reviews (Journal)**  
Romana Schirhagl (Editorial board member)  
1-Jan-2015 → 31-Dec-2015

**European Physical Society (EPS) (External organisation)**  
Romana Schirhagl (Member)  
2015 → ...

**Progress Physics Projectruimte (formerly FOM Projectruimte), NWO (External organisation)**

Romana Schirhagl (Member)

2015 → 2018

**American Chemical Society (External organisation)**

Romana Schirhagl (Member)

2014 → ...

**Deutsche Bunsen-Gesellschaft für physikalische Chemie e. V. (DBG) (External organisation)**

Romana Schirhagl (Member)

2014 → ...

**External adviser**

Romana Schirhagl (Examiner)

2014 → ...

**Frontiers in Materials : Translational Materials Science (Journal)**

Romana Schirhagl (Editorial board member)

2014 → ...

**W.J. Kolff Institute for Biomedical Engineering and Materials Science (KOLFF) (Organisational unit)**

Romana Schirhagl (Member)

2014 → ...

**The German Chemical Society (GDCh) (External organisation)**

Romana Schirhagl (Member)

2013 → ...

**QSIT - Quantum Science and Technology (External organisation)**

Romana Schirhagl (Member)

2012 → 2014

**The Royal Society of Chemistry (RSC) (External organisation)**

Romana Schirhagl (Member)

2012 → ...

**The Society for Molecular Imprinting (SMI) (External organisation)**

Romana Schirhagl (Member)

2012 → ...

**Austrian Scientists in Northern America (ASCINA) (External organisation)**

Romana Schirhagl (Member)

2010 → ...

**Austrian Chemical Society, Medicinal Chemistry (External organisation)**

Romana Schirhagl (Member)

2007 → ...

## Research output

**Intracellular Quantum Sensing of Free-Radical Generation Induced by Acetaminophen (APAP) in the Cytosol, in Mitochondria and the Nucleus of Macrophages**

Sharmin, R., Nusantara, A. C., Nie, L., Wu, K., Elias Llumbet, A., Woudstra, W., Mzyk, A. & Schirhagl, R., 10-Nov-2022, In: ACS Sensors. 7, 11, p. 3326-3334 9 p.

### **Relaxometry for detecting free radical generation during Bacteria's response to antibiotics**

Norouzi, N., Nusantara, A. C., Ong, Y., Hamoh, T., Nie, L., Morita, A., Zhang, Y., Mzyk, A. & Schirhagl, R., 31-Oct-2022, In: Carbon. 199, p. 444-452 9 p.

### **Intracellular Relaxometry, Challenges, and Future Directions**

Sigaeva, A., Norouzi, N. & Schirhagl, R., 19-Oct-2022, (E-pub ahead of print) In: ACS central science.

### **Detecting free radicals post viral infections**

Damle, V. G., Wu, K., Arouri, D. J. & Schirhagl, R., Oct-2022, In: Free Radical Biology and Medicine. 191, p. 8-23 16 p.

### **Single-Particle Tracking and Trajectory Analysis of Fluorescent Nanodiamonds in Cell-Free Environment and Live Cells**

Sigaeva, A., Hochstetter, A., Bouyim, S., Chipaux, M., Stejfova, M., Cigler, P. & Schirhagl, R., 29-Aug-2022, (E-pub ahead of print) In: Small. 17 p., 2201395.

### **Functionalized Fluorescent Nanodiamonds for Simultaneous Drug Delivery and Quantum Sensing in HeLa Cells**

Tian, Y., Nusantara, A. C., Hamoh, T., Mzyk, A., Tian, X., Martinez, F. P., Li, R., Permentier, H. P. & Schirhagl, R., 19-Aug-2022, (E-pub ahead of print) In: ACS Applied Materials & Interfaces. 14, 34, p. 39265–39273 9 p.

### **Nanotechnology from lab to industry - a look at current trends**

Rambaran, T. & Schirhagl, R., 1-Aug-2022, (E-pub ahead of print) In: Nanoscale advances. 12 p.

### **Insight into a Fenton-like Reaction Using Nanodiamond Based Relaxometry**

Padamati, S. K., Vedelaar, T. A., Martinez, F. P., Nusantara, A. C. & Schirhagl, R., Jul-2022, In: Nanomaterials. 12, 14, 12 p., 2422.

### **Nanoscale MRI for Selective Labeling and Localized Free Radical Measurements in the Acrosomes of Single Sperm Cells**

Reyes-San-Martin, C., Hamoh, T., Zhang, Y., Berendse, L., Klijn, C., Li, R., Llumbet, A. E., Sigaeva, A., Kawałko, J., Mzyk, A. & Schirhagl, R., 30-Jun-2022, In: Acs Nano. 16, 7, p. 10701–10710 10 p.

### **Applying NV center-based quantum sensing to study intracellular free radical response upon viral infections**

Wu, K., Vedelaar, T. A., Damle, V. G., Morita, A., Mougnaud, J., Reyes San Martin, C., Zhang, Y., van der Pol, D. P. I., Ende-Metselaar, H., Rodenhuis-Zybert, I. & Schirhagl, R., 1-Jun-2022, In: Redox Biology. 52, 11 p., 102279.

### **Quantum Sensing of Free Radicals in Primary Human Dendritic Cells**

Nie, L., Nusantara, A. C., Damle, V. G., Baranov, M. V., Chipaux, M., Reyes-San-Martin, C., Hamoh, T., Epperla, C. P., Guricova, M., Cigler, P., Van Den Bogaart, G. & Schirhagl, R., 23-Feb-2022, In: Nano Letters. 22, 4, p. 1818-1825 8 p.

### **Following Polymer Degradation with Nanodiamond Magnetometry**

Li, R., Vedelaar, T., Mzyk, A., Morita, A., Padamati, S. K. & Schirhagl, R., 28-Jan-2022, In: ACS Sensors. 1, p. 123-130

### **Diamond Color Centers in Diamonds for Chemical and Biochemical Analysis and Visualization**

Mzyk, A., Ong, Y., Ortiz Moreno, A. R., Padamati, S. K., Zhang, Y., Reyes-San-Martin, C. A. & Schirhagl, R., 11-Jan-2022, In: Analytical Chemistry. 94, 1, p. 225-249 25 p.

### **Fluorescent Nanodiamonds for Detecting Free-Radical Generation in Real Time during Shear Stress in Human Umbilical Vein Endothelial Cells**

Sharmin, R., Hamoh, T., Sigaeva, A., Mzyk, A., Damle, V. G., Morita, A., Vedelaar, T. & Schirhagl, R., 24-Dec-2021, In: ACS Sensors. 6, 12, p. 4349-4359 11 p.

### **Drug delivery and antimicrobial studies of chitosan-alginate based hydroxyapatite bioscaffolds formed by the Casein micelle assisted synthesis**

Jariya, S. A. I., Padmanabhan, V. P., Kulandaivelu, R., Prakash, N., Mohammad, F., Al-Lohedan, H. A., Paiman, S., Schirhagl, R., Hossain, M. A. M. & Sagadevan, S., 1-Nov-2021, In: Materials Chemistry and Physics. 272, 11 p., 125019.

#### **Male subfertility and oxidative stress**

Evans, E. P. P., Scholten, J. T. M., Mzyk, A., Reyes-San-Martin, C., Llumbet, A. E., Hamoh, T., Arts, E. G. J. M., Schirhagl, R. & Cantineau, A. E. P., Oct-2021, In: *Redox Biology*. 46, 17 p., 102071.

#### **Pharmacodynamic studies of fluorescent diamond carriers of doxorubicin in liver cancer cells and colorectal cancer organoids**

Firestein, R., Marcinkiewicz, C., Nie, L., Chua, H. K., Quesada, I. V., Torelli, M., Sternberg, M., Gligorijevic, B., Shenderova, O., Schirhagl, R. & Feuerstein, G. Z., Sep-2021, In: *Nanotechnology, Science and Applications*. 14, p. 139-159 21 p.

#### **Not all cells are created equal - endosomal escape in fluorescent nanodiamonds in different cells**

Zhang, Y., Sharmin, R., Sigaeva, A., Klijn, C. W. M., Mzyk, A. & Schirhagl, R., 21-Aug-2021, In: *Nanoscale*. 13, p. 13294-13300 7 p.

#### **pH Sensitive Dextran Coated Fluorescent Nanodiamonds as a Biomarker for HeLa Cells Endocytic Pathway and Increased Cellular Uptake**

Nie, L., Zhang, Y., Li, L., van Rijn, P. & Schirhagl, R., 15-Jul-2021, In: *Nanomaterials*. 11, 7, p. 1-11 11 p., 1837.

#### **Novel uric acid-based nano organocatalyst with phosphorous acid tags: Application for synthesis of new biologically-interest pyridines with indole moieties via a cooperative vinylogous anomeric based oxidation**

Kalhor, S., Zarei, M., Sepehrmansourie, H., Zolfigol, M. A., Shi, H., Wang, J., Arjomandi, J., Hasani, M. & Schirhagl, R., May-2021, In: *Molecular catalysis*. 507, 16 p., 111549.

#### **Quantum monitoring of cellular metabolic activities in single mitochondria**

Nie, L., Nusantara, A. C., Damle, V. G., Sharmin, R., Evans, E. P. P., Hemelaar, S. R., van der Laan, K. J., Li, R., Martinez, F. P. P., Vedelaar, T., Chipaux, M. & Schirhagl, R., May-2021, In: *Science Advances*. 7, 21, 8 p., 0573.

#### **Recent advances in natural polymer-based hydroxyapatite scaffolds: Properties and applications**

Lett, J. A., Sagadevan, S., Fatimah, I., Hoque, M. E., Lokanathan, Y., Leonard, E., Alshahateet, S. F., Schirhagl, R. & Oh, W. C., 5-Apr-2021, In: *European Polymer Journal*. 148, 18 p., 110360.

#### **Membrane-Based Scanning Force Microscopy**

Hälg, D., Gisler, T., Tsaturyan, Y., Catalini, L., Grob, U., Krass, M. D., Héritier, M., Mattiat, H., Thamm, A. K., Schirhagl, R., Langman, E. C., Schliesser, A., Degen, C. L. & Eichler, A., Feb-2021, In: *Physical Review Applied*. 15, 2, 6 p., L021001.

#### **Synthesis of biological based hennotannic acid-based salts over porous bismuth coordination polymer with phosphorous acid tags**

Babaei, S., Zarei, M., Zolfigol, M. A., Khazalpour, S., Hasani, M., Rinner, U., Schirhagl, R., Norouzi, N. & Rostamnia, S., 22-Jan-2021, In: *RSC Advances*. 11, 4, p. 2141-2157 17 p.

#### **Nanodiamond Relaxometry-Based Detection of Free-Radical Species When Produced in Chemical Reactions in Biologically Relevant Conditions**

Martinez, F. P., Nusantara, A. C., Chipaux, M., Padamati, S. K. & Schirhagl, R., 24-Dec-2020, In: *ACS Sensors*. 5, 12, p. 3862-3869 8 p.

#### **Influence of sonication on the physicochemical and biological characteristics of selenium-substituted hydroxyapatites**

Padmanabhan, V. P., Kulandaivelu, R., Venkatachalam, V., Veerla, S. C., Mohammad, F., Al-Lohedan, H. A., Oh, W. C., Schirhagl, R., Obulapuram, P. K., Hoque, M. E. & Sagadevan, S., 28-Oct-2020, In: *New Journal of Chemistry*. 44, 40, p. 17453-17464 12 p.

#### **Targeting Nanodiamonds to the Nucleus in Yeast Cells**

Morita, A., Hamoh, T., Sigaeva, A., Norouzi, N., Nagl, A., van der Laan, K. J., Evans, E. P. P. & Schirhagl, R., Oct-2020, In: *Nanomaterials*. 10, 10, p. 1-10 10 p.



**Quantum monitoring the metabolism of individual yeast mutant strain cells when aged, stressed or treated with antioxidant**  
Morita, A., Nusantara, C., Perona Martinez, F., Hamoh, T., Damle, V., Laan, van der, K., Sigaeva, A., Vedelaar, T., Chang, M., Chipaux, M. & Schirhagl, R., 31-Jul-2020, (Submitted) In: ArXiv. 36 p.

**Micro Versus Macro: The Effect of Environmental Confinement on Cellular Nanoparticle Uptake**  
Damle, V. G., Sharmin, R., Morita, A., Nie, L. & Schirhagl, R., 24-Jul-2020, In: Frontiers in Bioengineering and Biotechnology. 8, 13 p., 869.

**Effect of medium and aggregation on antibacterial activity of nanodiamonds**  
Norouzi, N., Ong, Y., Damle, V. G., Najafi, M. B. H. & Schirhagl, R., Jul-2020, In: Materials science & engineering c- Biomimetic and supramolecular systems. 112, 8 p., 110930.

**High Temperature Treatment of Diamond Particles Toward Enhancement of Their Quantum Properties**  
Torelli, M. D., Nunn, N. A., Jones, Z. R., Vedelaar, T., Padamati, S. K., Schirhagl, R., Hamers, R. J., Shames, A. I., Danilov, E. O., Zaitsev, A. & Shenderova, O. A., 10-Jun-2020, In: Frontiers of Physics. 8, 11 p., 205.

**Influence of diamond crystal orientation on the interaction with biological matter**  
Damle, V., Wu, K., De Luca, O., Orti-Casan, N., Norouzi, N., Morita, A., de Vries, J., Kaper, H., Zuhorn, I. S., Eisel, U., Vanpoucke, D. E. P., Rudolf, P. & Schirhagl, R., Jun-2020, In: Carbon. 162, p. 1-12 12 p.

**Polyelectrolyte Multilayer Films Modification with Ag and rGO Influences Platelets Activation and Aggregate Formation under In Vitro Blood Flow**  
Imbir, G., Mzyk, A., Trembecka-Wójciga, K., Jasek-Gajda, E., Plutecka, H., Schirhagl, R. & Major, R., May-2020, In: Nanomaterials (Basel, Switzerland). 10, 5, 17 p., 859.

**The Fate of Lipid-Coated and Uncoated Fluorescent Nanodiamonds during Cell Division in Yeast**  
Morita, A., Hamoh, T., Martinez, F. P. P., Chipaux, M., Sigaeva, A., Mignon, C., Laan, K. J. V. D., Hochstetter, A. & Schirhagl, R., Mar-2020, In: Nanomaterials (Basel, Switzerland). 10, 3, 17 p., 516.

**Evaluation of the Oxidative Stress Response of Aging Yeast Cells in Response to Internalization of Fluorescent Nanodiamond Biosensors**  
van der Laan, K. J., Morita, A., Perona-Martinez, F. P. & Schirhagl, R., 20-Feb-2020, In: Nanomaterials (Basel, Switzerland). 10, 2, 13 p., 372.

**Exploring the thumbprints of Ag-hydroxyapatite composite as a surface coating bone material for the implants**  
Lett, J. A., Sagadevan, S., Paiman, S., Mohammad, F., Schirhagl, R., Leonard, E., Alshahateet, S. F. & Oh, W-C., 2020, In: Journal of Materials Research and Technology. 9, 6, p. 12824-12833 10 p.

**Non enzymatic fluorometric determination of glucose by using quenchable g-C<sub>3</sub>N<sub>4</sub> quantum dots**  
Gan, X., Zhao, H., Schirhagl, R. & Quan, X., Dec-2019, In: Microchimica Acta. 186, 12, 10 p., 779.

**Nanodiamond uptake in colon cancer cells: the influence of direction and trypsin-EDTA treatment**  
Sigaeva, A., Morita, A., Hemelaar, S. R. & Schirhagl, R., 7-Oct-2019, In: Nanoscale. 11, 37, p. 17357-17367 11 p.

**Smart probe for simultaneous detection of copper ion, pyrophosphate, and alkaline phosphatase in vitro and in clinical samples**  
Kiran, S., Khatik, R. & Schirhagl, R., Sep-2019, In: Analytical and Bioanalytical Chemistry. 411, 24, p. 6475-6485 11 p.

**Nanodiamond for Sample Preparation in Proteomics**  
Perona Martinez, F., Nagl, A., Guluzade, S. & Schirhagl, R., 6-Aug-2019, In: Analytical Chemistry. 91, 15, p. 9800-9805 6 p.

#### **Paving the way for intracellular detection of free radicals with nanodiamond magnetometry**

Sigaeva, A., Martinez, F. P., Nusantara, A. C., Mougios, N. & Schirhagl, R., 1-Aug-2019, In: Free Radical Biology and Medicine. 139, S1, p. S50 1 p.

#### **Cell Uptake of Lipid-Coated Diamond**

Morita, A., Perona Martinez, F., Chipaux, M., Jamot, N., Hemelaar, S., Laan, van der, K. & Schirhagl, R., Aug-2019, In: Particle and Particle Systems Characterization. 36, 8, 8 p., 1900116.

#### **Facile in situ generation of bismuth tungstate nanosheet-multiwalled carbon nanotube composite as unconventional affinity material for quartz crystal microbalance detection of antibiotics**

Munawar, A., Schirhagl, R., Rehman, A., Shaheen, A., Taj, A., Bano, K., Bassous, N. J., Webster, T. J., Khan, W. S. & Bajwa, S. Z., 5-Jul-2019, In: Journal of hazardous materials. 373, p. 50-59 10 p.

#### **Optical Detection of Intracellular Quantities Using Nanoscale Technologies**

Sigaeva, A., Ong, Y., Damle, V. G., Morita, A., van der Laan, K. J. & Schirhagl, R., Jul-2019, In: Accounts of Chemical Research. 52, 7, p. 1739-1749 11 p.

#### **Nanosensors for diagnosis with optical, electric and mechanical transducers**

Munawar, A., Ong, Y., Schirhagl, R., Tahir, M. A., Khan, W. S. & Bajwa, S. Z., 27-Feb-2019, In: RSC Advances. 9, p. 6793-6803 11 p.

#### **Toward Using Fluorescent Nanodiamonds To Study Chronological Aging in *Saccharomyces cerevisiae***

van der Laan, K., Naulleau, J., Damle, V. G., Sigaeva, A., Jamot, N., Perona Martinez, F. P., Chipaux, M. & Schirhagl, R., 20-Nov-2018, In: Analytical Chemistry. 90, 22, p. 13506-13513 8 p.

#### **Two-dimensional nanomaterial based sensors for heavy metal ions**

Gan, X., Zhao, H., Schirhagl, R. & Quan, X., Oct-2018, In: Mikrochimica Acta. 185, 10, 30 p., 478.

#### **Interaction of nanodiamonds with bacteria**

Ong, S. Y., van Harmelen, R. J. J., Norouzi, N., Offens, F., Habibi Najafi, M. B., Schirhagl, R. & Venema, I., 26-Sep-2018, In: Nanoscale. 10, 36, p. 17117-17124 8 p.

#### **Instantaneous magnetic resonance spectroscopy of a sample**

Chipaux, M. S. & Schirhagl, R., 12-Jul-2018, Patent No. WO2018128543, Priority date 6-Jan-2017

#### **Nanodiamonds and Their Applications in Cells**

Chipaux, M., van der Laan, K. J., Hemelaar, S. R., Hasani, M., Zheng, T. & Schirhagl, R., 14-Jun-2018, In: Small. 14, 24, 25 p., 1704263.

#### **Fluorescent nanodiamonds: potential free radical detectors in live cells**

Sigaeva, A., Hamoh, T., Perona, F. & Schirhagl, R., 20-May-2018, In: Free Radical Biology and Medicine. 120, p. S87-S87 1 p.

#### **Nanodiamonds for In Vivo Applications**

van der Laan, K., Hasani, M., Zheng, T. & Schirhagl, R., 9-May-2018, In: Small. 14, 19, 17 p., 1703838.

#### **The Response of HeLa Cells to Fluorescent NanoDiamond Uptake**

Hemelaar, S. R., Saspaanithy, B., L'Hommelet, S. R. M., Perona Martinez, F. P., van der Laan, K. J. & Schirhagl, R., 26-Jan-2018, In: Sensors. 18, 2, 15 p., 355.

#### **Method and detector for microscopic measurement by means of a colour center**

Schirhagl, R., Perona Martinez, F. P. & Chipaux, M. S., 21-Dec-2017, Patent No. WO2017217847, Priority date 16-Jun-2016

**Recombinant Protein Polymers for Colloidal Stabilization and Improvement of Cellular Uptake of Diamond Nanosensors**  
Zheng, T., Martinez, F. P., Storm, I. M., Rombouts, W., Sprakel, J., Schirhagl, R. & de Vries, R., 5-Dec-2017, In: Analytical Chemistry. 89, 23, p. 12812-12820 9 p.

**Synthesis of novel magnetic nanoparticles with urea or urethane moieties: Applications as catalysts in the Strecker synthesis of alpha-aminonitriles**

Bagheri, S., Zolfigol, M. A., Schirhagl, R., Hasani, M., Stuart, M. C. A. & Nagl, A., Dec-2017, In: Applied Organometallic Chemistry. 31, 12, 10 p., e3883.

**Nanoparticle discrimination based on wavelength and lifetime-multiplexed cathodoluminescence microscopy**

Garming, M. W. H., Weppelman, I. G. C., de Boer, P., Martínez, F. P., Schirhagl, R., Hoogenboom, J. P. & Moerland, R. J., 14-Sep-2017, In: Nanoscale. 9, 34, p. 12727-12734 8 p.

**{[1,4-DHPyrazine][C(CN)<sub>3</sub>]<sub>2</sub>} as a New Nano Molten Salt Catalyst for the Synthesis of Novel Piperazine Based bis(4-hydroxy-2H-chromen-2-one) Derivatives**

Bagheri, S., Zolfigol, M. A., Schirhagl, R. & Hasani, M., Aug-2017, In: Catalysis Letters. 147, 8, p. 2083-2099 17 p.

**Generally Applicable Transformation Protocols for Fluorescent Nanodiamond Internalization into Cells**

Hemelaar, S. R., van der Laan, K. J., Hinterding, S. R., Koot, M. V., Ellermann, E., Perona-Martinez, F. P., Roig, D., Hommelet, S., Novarina, D., Takahashi, H., Chang, M. & Schirhagl, R., 19-Jul-2017, In: Scientific Reports. 7, 7 p., 5862.

**Towards Magnetic Mapping of Cellular Organelles using Fluorescent Nanodiamonds**

Hemelaar, S. R., van der Laan, K. J. & Schirhagl, R., Jul-2017, In: Free Radical Biology and Medicine. 108, p. S106-S106 1 p.

**Application of Triphenylammonium Tricyanomethanide as an Efficient and Recyclable Nanostructured Molten-Salt Catalyst for the Synthesis of N-Benzylidene-2-arylimidazo[1,2-a] pyridin-3-amines**

Bagheri, S., Zolfigol, M. A., Schirhagl, R. & Hasani, M., Jun-2017, In: Synlett. 28, 10, p. 1173-1176 4 p.

**Shape and crystallographic orientation of nanodiamonds for quantum sensing**

Ong, S. Y., Chipaux, M., Nagl, A. & Schirhagl, R., 7-May-2017, In: PCCP : Physical Chemistry Chemical Physics. 19, 17, p. 10748-10752 5 p.

**Nanodiamonds as multi-purpose labels for microscopy**

Hemelaar, S. R., de Boer, P., Chipaux, M., Zuidema, W., Hamoh, T., Martinez, F. P., Nagl, A., Hoogenboom, J. P., Giepmans, B. N. G. & Schirhagl, R., 7-Apr-2017, In: Scientific Reports. 7, 1, 9 p., 720.

**The interaction of fluorescent nanodiamond probes with cellular media**

Hemelaar, S. R., Nagl, A., Bigot, F., Rodriguez Garcia, M., de Vries, M. P., Chipaux, M. & Schirhagl, R., Apr-2017, In: Microchimica Acta. 184, 4, p. 1001-1009 9 p.

**Transferring the Selectivity of a Natural Antibody into a Molecularly Imprinted Polymer**

Schirhagl, R., 3-Mar-2017, In: Methods in Molecular Biology. 1575, p. 325-340 16 p.

**Gravimetric Viral Diagnostics: QCM Based Biosensors for Early Detection of Viruses**

Afzal, A., Mujahid, A., Schirhagl, R., Bajwa, S. Z., Latif, U. & Feroz, S., 13-Feb-2017, In: Chemosensors. 5, 1, p. 1-25 25 p.

**Viruses, Artificial Viruses and Virus-Based Structures for Biomedical Applications**

van Rijn, P. & Schirhagl, R., 22-Jun-2016, In: Advanced healthcare materials. 5, 12, p. 1386-1400 15 p.

**Switchable, self-assembled CdS nanomaterials embedded in liquid crystal cell for high performance static memory device**

Pal, K., Yang, X., Mohan, M. L. N. M., Schirhagl, R. & Wang, G., 15-Apr-2016, In: Materials Letters. 169, p. 37-41 5 p.

**Applications of Molecularly Imprinted Polymer Nanoparticles and Their Advances toward Industrial Use: A Review**  
Wackerlig, J. & Schirhagl, R., 5-Jan-2016, In: Analytical Chemistry. 88, 1, p. 250-261 12 p.

**Optical and Electrical Investigation of ZnO Nano-Wire Array to Micro-Flower from Hierarchical Nano-Rose Structures**  
Pal, K., Zhan, B., Ma, X., Wang, G., Schirhagl, R. & Murgasen, P., Jan-2016, In: Journal of Nanoscience and Nanotechnology. 16, 1, p. 400-409 10 p.

**Bioinspired surfaces and materials**

Schirhagl, R., Weder, C., Lei, J., Werner, C. & Textor, H. M., 2016, In: Chemical Society Reviews. 45, 2, p. 234-236 3 p.

**Bioinspired Surfaces and Materials**

Schirhagl, R., Weder, C., Lei, J., Werner, C. & Textor, H. M., 2016, In: Chemical Society Reviews. 45, p. 234-236

**Bioinspired Surfaces and Materials**

Schirhagl, R. (ed.), Weder, C. (ed.), Weder, C. (ed.), Lei, J. (ed.) & Textor, H. M. (ed.), 2016, In: Chemical Society Reviews. 45, 2 (special issue)

**Influence of ZnO nanostructures in liquid crystal interfaces for bistable switching applications**

Pal, K., Zhan, B., Mohan, M. L. N. M., Schirhagl, R. & Wang, G., 1-Dec-2015, In: Applied Surface Science. 357, B, p. 1499-1510 12 p.

**Nanometer-scale isotope analysis of bulk diamond by atom probe tomography**

Schirhagl, R., Raatz, N., Meijer, J., Markham, M., Gerstl, S. S. A. & Degen, C. L., Nov-2015, In: Diamond and Related Materials. 60, p. 60-65 6 p.

**Improving surface and defect center chemistry of fluorescent nanodiamonds for imaging purposes-a review**

Nagl, A., Hemelaar, S. R. & Schirhagl, R., Oct-2015, In: Analytical and Bioanalytical Chemistry. 407, 25, p. 7521-7536 16 p.

**Bioapplications of Molecularly Imprinted Polymers**

Schirhagl, R., 2014, In: Analytical Chemistry. p. 250-261 12 p.

**Investigation of Surface Magnetic Noise by Shallow Spins in Diamond**

Roskopf, T., Dussaux, A., Ohashi, K., Loretz, M., Schirhagl, R., Watanabe, H., Shikata, S., Itoh, KM. & Degen, CL., 2014 , In: Physical Review Letters. 112, 14, p. 147602 5 p.

**Nitrogen-Vacancy Centers in Diamond: Nanoscale Sensors for Physics and Biology**

Schirhagl, R., Chang, K., Loretz, M. & Degen, C. L., 2014, In: Annual Review of Physical Chemistry. 65, p. 83-105 23 p.

**Advanced vapor recognition materials for selective and fast responsive surface acoustic wave sensors: A review**

Afzal, A., Iqbal, N., Mujahid, A. & Schirhagl, R., 13-May-2013, In: Analytica Chimica Acta. 787, p. 36-49 14 p.

**Bioapplications for Molecularly Imprinted Polymers**

Schirhagl, R., 2013, In: Analytical Chemistry. 86, 1, p. 250-261 12 p.

**Devices and methods for separating particles**

Schirhagl, R., Zare, R. N., Ren, K. & Banaei, N., 2013, Patent No. US 20130309657 A1, Priority date 17-May-2012

**Efficient one-step novel synthesis of ZnO nanopikes to nanoflakes doped OAFLCs (W-182) host: Optical and dielectric response**

Pal, K., Pal Majumder, T., Schirhagl, R., Ghosh, S., Roy, S. K. & Dabrowski, R., 2013, In: Applied Surface Science. 280, p. 405-417 13 p.

**Temperature variation dielectric behavior of TiO<sub>2</sub> nanocabbages and doped W-182 (AFLC)**

Pal, K., Sankar Roy, J., Majumder, T. P., Ghosh, S., Kumar Roy, S., Schirhagl, R. & Dabrowski, R., 2013, In: Journal of Luminescence. 136, p. 278-284 7 p.

**Immunosensing with artificial antibodies in organic solvents or complex matrices**

Schirhagl, R., Qian, J. & Dickert, F. L., 2012, In: Sensors and Actuators B: Chemical. 173, p. 585-590 6 p.

**Microfluidic capture and release of bacteria in a conical nanopore array**

Guo, P., Hall, E. W., Schirhagl, R., Mukaibo, H., Martin, C. R. & Zare, R. N., 2012, In: Lab on a Chip - Miniaturisation for Chemistry and Biology. 12, 3, p. 558-561 4 p.

**Natural and biomimetic materials for the detection of insulin**

Schirhagl, R., Latif, U., Podlipna, D., Blumenstock, H. & Dickert, F. L., 2012, In: Analytical Chemistry. 84, 9, p. 3908-3913 6 p.

**Separation of bacteria with imprinted polymeric films**

Schirhagl, R., Hall, E. W., Fuereder, I. & Zare, R. N., 2012, In: Analyst. 137, 6, p. 1495-1499 5 p.

**Spin properties of very shallow nitrogen vacancy defects in diamond**

Ofori-Okai, BK., Pezzagna, S., Chang, K., Loretz, M., Schirhagl, R., Tao, Y., Moores, BA., Groot-Berning, K., Meijer, J. & Degen, CL., 2012, In: Physical Review B. 86, 8, p. 081406

**Surface-imprinted polymers in microfluidic devices**

Schirhagl, R., Ren, K. & Zare, R. N., 2012, In: Science china-Chemistry. 55, 4, p. 469-483 15 p.

**Atrazine detection based on antibody replicas**

Schirhagl, R., Latif, U. & Dickert, F. L., 2011, In: Journal of Materials Chemistry. 21, 38, p. 14594-14598 5 p.

**Glucose-driven fuel cell constructed from enzymes and filter paper**

Ge, J., Schirhagl, R. & Zare, R. N., 2011, In: Journal of Chemical Education. 88, 9, p. 1283-1286 4 p.

**Microfluidic purification and analysis of hematopoietic stem cells from bone marrow**

Schirhagl, R., Fuereder, I., Hall, E. W., Medeiros, B. C. & Zare, R. N., 2011, In: Lab on a Chip - Miniaturisation for Chemistry and Biology. 11, 18, p. 3130-3135 6 p.

**Particle sorting using a porous membrane in a microfluidic device**

Wei, H., Chueh, B., Wu, H., Hall, E. W., Li, C., Schirhagl, R., Lin, J-M. & Zare, R. N., 2011, In: Lab on a Chip - Miniaturisation for Chemistry and Biology. 11, 2, p. 238-245 8 p.

**Biorekognition mit strukturierten Oberflächen--Sensoranwendungen zur Insulin-und Allergendetektion**

Dickert, FL., Lieberzeit, P., Schirhagl, R., Aigner, S., Sontimuang, C., Suedee, R. & Blumenstock, H., 2010, In: Sensoren und Messsysteme.

**Chemosensors for viruses based on artificial immunoglobulin copies**

Schirhagl, R., Lieberzeit, P. A. & Dickert, F. L., 2010, In: Advanced materials. 22, 18, p. 2078-2081 4 p.

**Comparing biomimetic and biological receptors for insulin sensing**

Schirhagl, R., Podlipna, D., Lieberzeit, P. A. & Dickert, F. L., 2010, In: Chemical Communications. 46, 18, p. 3128-3130 3 p.

**Sensors for Healthcare Monitoring-Proteins, Viruses and Blood-Group-Typing**

Dickert, FL., Lieberzeit, PA., Seifner, A., Schirhagl, R. & Jungbauer, C., 2010, *World Congress on Medical Physics and Biomedical Engineering, September 7-12, 2009, Munich, Germany*. Dossel, O. & Schlegel, W. C. (eds.). Springer, Vol.

25/8. p. 325-328 4 p.

**A1. 2-Replicae of Antibodies-Robust Mass-Sensitive Sensors for Allergens and Other Bioanalytes**

Dickert, F. L., Schirhagl, R., Lieberzeit, P. A., Hussain, T. F. & Cichna-Markl, M., 2009, In: Proceedings SENSOR. p. 29-33 5 p.

**Detection of viruses with molecularly imprinted polymers integrated on a microfluidic biochip using contact-less dielectric microsensors**

Birnbaumer, G. M., Lieberzeit, P. A., Richter, L., Schirhagl, R., Milnera, M., Dickert, F. L., Bailey, A. & Ertl, P., 2009, In: Lab on a Chip. 9, 24, p. 3549-3556 8 p.

**Sensing picornaviruses using molecular imprinting techniques on a quartz crystal microbalance**

Jenik, M., Schirhagl, R., Schirk, C., Hayden, O., Lieberzeit, P., Blaas, D., Paul, G. & Dickert, F. L., 2009, In: Analytical Chemistry. 81, 13, p. 5320-5326 7 p.