Name: M. (Marek) Kolmer
Center for Nanophase Materials Sciences
Oak Ridge National Laboratory (ORNL)
1 Bethel Valley Rd., Oak Ridge, TN 37831

Position Title: Research Associate
(865) 241-8276
(865) 574-1753 FAX
kolmerma@ornl.gov

Education:
Jagiellonian University in Krakow, Poland, MSc 2010 Physics
Jagiellonian University in Krakow, Poland, Ph.D. 2014 Physics

Professional Experience:

2018–present	Postdoctoral Research Associate, Center for Nanophase Materials Sciences, ORNL
2015–2018	Postdoctoral Researcher, Jagiellonian University in Krakow, Poland
2014–2015	Visiting Researcher, CEMES/CNRS Toulouse, France
2011–2014	Research Assistant, Jagiellonian University in Krakow, Poland
2010	Internship, Institute of Materials Research and Engineering (IMRE), Singapore

Technical Expertise:
Low-temperature ultra-high vacuum scanning probe microscopy (SPM) and related surface science techniques.

Research Interests:
1. Electronic transport at the atomic- and nanometer-scales determined by multiprobe SPM;
2. On-surface chemistry methods in organic synthesis;
3. Atomic-scale systems fabricated on semiconducting substrates.

Professional Honors, Awards:
AVS Nanometer-Scale Science and Technology Division Early Career Competition Award, finalist, 2019
Rector's Individual Award for Scientific Activity, Jagiellonian University, 2017
START Scholarships, Foundation for Polish Science, Poland, 2015 & 2016
ETIUDA Scholarship, nr 2013/08/T/ST3/00047, National Science Center, Poland, 2013-2015
KNOW Consortium Award for series of scientific publications, Krakow, 2014
Rector's Group Award for Scientific Activity, Jagiellonian University, 2013 & 2016 & 2017
Rector's Scholarship for best PhD students, Jagiellonian University, 2012/2013 & 2013/2014
Singapore International Pre-Graduate Award, Singapore, 2010
Young Scientist Award, School-Conference Advanced Materials and Technologies, Palanga, Lithuania, 2008

Research Projects (as Principal Investigator):
"Covalently coupled organic structures formed on titania surfaces by polymerization reaction of aryl halides", project nr 0341/IP3/2016/74, Polish Ministry of Science and Higher Education, 2016-2019

Professional Memberships:
American Vacuum Society and American Physical Society

Books:
"On-Surface Atomic Wires and Logic Gates," Editors: Marek Kolmer, Christian Joachim, *Springer-Nature Publishing Group*, ISBN 978-3-319-51846-6, DOI: 10.1007/978-3-319-51847-3 (2017)

Selected 10 Peer-Reviewed Articles: (total # 29, h index 13, citations # ~430, from Web of Science)

Kolmer, M.; Brandimarte P.; Lis J.; Zuzak R.; Godlewski S.; Kawai H.; Garcia-Lekue A.; Lorente N.; Frederiksen T.; Joachim C.; Sanchez-Portal D.; Szymonski M., "Electronic transport in planar atomic-scale structures measured by two-probe scanning tunneling spectroscopy," *Nature Communications* **10**, 1573 (2019).

Kolmer M.; Zuzak R.; Steiner A.K.; Zajac L.; Engelund M.; Godlewski S.; Szymonski M.; Amsharov K., "Fluorine-programmed nanozipping to tailored nanographenes on rutile TiO_2 surfaces," *Science* **363**, 57–60 (2019).

Kolmer M.; Olszowski P.; Zuzak R.; Godlewski S.; Joachim C.; Szymonski M., "Two-probe STM experiments at the atomic level," *Journal of Physics: Condensed Matter* **29** (44), 444004 (2017).

Kolmer M.; Zuzak R.; Dridi G.; Godlewski S.; Joachim C.; Szymonski M., "Realization of a Quantum Hamiltonian Boolean logic gate on the Si(001):H surface," *Nanoscale* **7**, 12325–12330 (2015).

Kolmer M.; Zuzak R.; Zebari A.A.A.; Godlewski S.; Jakub S. Prauzner-Bechcicki J.S.; Piskorz W.; Zasada F.; Sojka Z.; Bleger D.; Hecht S.; Szymonski M., "On-surface polymerization on a semiconducting oxide: aryl halide coupling controlled by surface hydroxyl groups on rutile TiO_2(011)," *Chemical Communications* **51**, 11276-11279 (2015).

Kolmer M.; Godlewski S.; Zuzak R.; Wojtaszek M.; Rauer C.; Thuaire A.; Hartmann J.M.; Moriceau H.; Joachim C.; Szymonski M., "Atomic scale fabrication of dangling bond structures on hydrogen passivated Si(001) wafers processed and nanopackaged in a clean room environment," *Applied Surface Science* **288**, 83– 89 (2014).

Kolmer M.; Zebari A.A.A.; Goryl M.; Buatier de Mongeot F.; Zasada F.; Piskorz W.; Pietrzyk P.; Sojka Z.; Krok F.; Szymonski M., "Temperature-dependent orientation of self-organized nanopatterns on ion-irradiated TiO_2(110)," *Physical Review B* **88**, 195427 (2013).

Godlewski S.; Kolmer M.; Kawai H.; Such B.; Zuzak R.; Saeys M.; De Mendoza P.; Echavarren A.M.; Joachim C.; Szymonski M., "Contacting a conjugated molecule with a surface dangling bond dimer on a Ge(001):H surface allows imaging of the hidden ground electronic state," *ACS Nano* **7** (11), 10105-10111 (2013).

Kolmer M.; Zebari A.A.A.; Prauzner-Bechcicki J.S.; Piskorz W.; Zasada F.; Godlewski S.; Such B.; Sojka Z.; Szymonski M., "Polymerization of polyanthrylene on a titanium dioxide (011)-(2×1) surface," *Angewandte Chemie - International Edition* **52**, 10300 –10303 (2013).

Kolmer M.; Godlewski S.; Kawai H.; Such B.; Krok F.; Saeys M.; Joachim C.; Szymonski M., "Electronic properties of STM-constructed dangling-bond dimer lines on a Ge(001)-(2×1):H surface," *Physical Review B* **86**, 125307 (2012).

Invited conference talks and invited external seminars:

(10/2019) Wilhelm und Else Heraeus-Seminar "Exploring the limits of nanoscience with scanning probe methods", Bad Honnef, Germany

(10/2019) Trends in Nanotechnology International Conference (TNT2019), San Sebastian, Spain

(04/2019) DPG Spring Meeting 2019, Regensburg, Germany

(04/2018) Seminar series of the Collaborative Research Centre (SFB) 953 "Synthetic Carbon Allotropes", Friedrich-Alexander Universität Erlangen-Nürnberg, Erlagen, Germany

(01/2018) Prof. T. Dietl group, Institute of Physics, Polish Academy of Science, Warsaw, Poland

(11/2017) AVS 64th International Symposium and Exhibition, Tampa, Florida, USA

(06/2017) VIII Krajowa Konferencja Nanotechnologii, Lodz, Poland

(02/2017) International Conference Nano Portugal 2017 (NanoPT), Porto, Portugal

(12/2016) Seminarium STM/AFM 2016, Zakopane, Poland

(09/2016) E-MRS 2016 Fall Meeting, Warsaw, Poland

(08/2016) 548th MANA Seminar, International Center for Materials NanoArchitectonics (MANA), National Institute for Materials Science (NIMS), Tsukuba, Japan

(03/2016) Dr. A. Fuhrer group, Science & Technology Department, IBM Research–Zurich, Rüschlikon, Switzerland

(03/2016) The 2016 EMN Meeting on Titanium-Oxides, Honolulu, Hawai, USA

(03/2016) Prof. R. Wolkow group, Department of Physics, University of Alberta, Edmonton, Alberta, Canada

(09/2014) International Workshop on Atomic Scale Wires, Krakow, Poland

Mentoring activities - thesis advisor (undergraduate students):

P. Pogorzelec, Jagiellonian University, Krakow, Poland (2018)

K. Warnello, Jagiellonian University, Krakow, Poland (2017)

PUBLICATIONS list (including books and chapters):

I) Books:

On-Surface Atomic Wires and Logic Gates, Editors: Marek Kolmer, Christian Joachim, Springer-Nature, 2017, ISBN 978-3-319-51846-6, DOI: 10.1007/978-3-319-51847-3

II) Peer-Reviewed Articles (from oldest to newest):

1. Goryl M., Budzioch J., Krok F., Wojtaszek M., Kolmer M., Walczak L., Konior J., Gnecco E., Szymonski M., 2012, ***Probing atomic-scale friction on reconstructed surfaces of single-crystal semiconductors***, *Physical Review B*, 85, 085308

2. Kolmer M., Godlewski S., Kawai H., Such B., Krok F., Saeys M., Joachim C., Szymonski M., 2012, ***Electronic properties of STM-constructed dangling-bond dimer lines on a Ge(001)-(2×1):H surface***, *Physical Review B*, 86, 125307

3. Kolmer M., Godlewski S., Lis J., Such B., Kantorovich L., Szymonski M., 2013, ***Construction of atomic-scale logic gates on a surface of hydrogen passivated germanium***, *Microelectronic Engineering*, 109, 262–265

4. Kolmer M., Zebari A.A.A., Prauzner-Bechcicki J.S., Piskorz W., Zasada F., Godlewski S., Such B., Sojka Z., Szymonski M., 2013, ***Polymerization of polyanthrylene on a titanium dioxide (011)-(2x1) surface***, *Angewandte Chemie - International Edition*, 52, 10300 –10303

5. Godlewski S., Kolmer M., Kawai H., Such B., Zuzak R., Saeys M., De Mendoza P., Echavarren A.M., Joachim C., Szymonski M., 2013, ***Contacting a conjugated molecule with a surface dangling bond dimer on a Ge(001):H surface allows imaging of the hidden ground electronic state***, *ACS Nano*, 7 (11), 10105-10111

6. Zebari A.A.A., Kolmer M., Prauzner-Bechcicki J.S., 2013, ***STM tip-assisted engineering of molecular nanostructures: PTCDA islands on Ge(001):H surfaces***, *Beilstein Journal of Nanotechnology*, 4, 927–932

7. Kolmer M., Zebari A.A.A., Goryl M., Buatier de Mongeot F., Zasada F., Piskorz W., Pietrzyk P., Sojka Z., Krok F., Szymonski M., 2013, ***Temperature-dependent orientation of self-organized nanopatterns on ion-irradiated TiO_2(110)***, *Physical Review B*, 88, 195427

8. Kolmer M., Godlewski S., Zuzak R., Wojtaszek M., Rauer C., Thuaire A., Hartmann J.M., Moriceau H., Joachim C., Szymonski M., 2014, ***Atomic scale fabrication of dangling bond structures on hydrogen passivated Si(001) wafers processed and nanopackaged in a clean room environment***, *Applied Surface Science*, 288, 83– 89

9. Zebari A.A.A., Kolmer M., Prauzner-Bechcicki J.S., 2015, ***Characterization of PTCDA nanocrystals onGe(001):H-(2×1)surfaces***, *Applied Surface Science*, 332, 403–408

10. Kolmer M., Zuzak R., Zebari A.A.A., Godlewski S., Jakub S. Prauzner-Bechcicki J.S., Piskorz W., Zasada F., Sojka Z., Bleger D., Hecht S., Szymonski M., 2015, ***On-surface polymerization on a semiconducting oxide: aryl halide coupling controlled by surface hydroxyl groups on rutile TiO_2(011)***, *Chemical Communications*, 51, 11276-11279

11. Kolmer M., Zuzak R., Dridi G., Godlewski S., Joachim C., Szymonski M., 2015, ***Realization of a Quantum Hamiltonian Boolean logic gate on the Si(001):H surface***, *Nanoscale*, 7, 12325–12330

12. Godlewski S., Kolmer M., Lis J., Zuzak R., Such B., Gren W., Szymonski M., Kantorovich L., 2015, ***Dynamical behavior of a dangling bond dimer on a hydrogenated semiconductor: Ge(001):H***, *Physical Review B*, 92, 115403

13. Engelund M., Zuzak R., Godlewski S., Kolmer M., Frederiksen T., García-Lekue A., Sánchez-Portal D.,Szymonski M., 2015, ***Tunneling spectroscopy of close-spaced dangling-bond pairs in Si(001):H***, *Scientific Reports*, 5, 14496

14. Wojtaszek M., Zuzak R., Godlewski S., Kolmer M., Lis J., Such B., Szymonski M., *2015*, ***Fermi level pinning at the Ge(001) surface-A case for non-standard explanation***, *Journal of Applied Physics*, 118, *185703*

15. Yang J., Sordes D., Kolmer M., Martrou D., Joachim C., 2016, ***Imaging, single atom contact and single atom manipulation at low temperature using the new ScientaOmicron LT-UHV-4 STM***, *The European Physical Journal - Applied Physics*, 73(1), 10702

16. Godlewski S., Kolmer M., Engelund M., Kawai H., Zuzak R., Garcia-Lekue A., Saeys M., Echavarren A.M., Joachim C., Sanchez-Portal D., Szymonski M., *2016*, ***Interaction of a conjugated polyaromatic molecule with a single dangling bond quantum dot on a hydrogenated semiconductor***, *Physical Chemistry Chemical Physics*, 18, *3854-3861*

17. Godlewski S., Kawai H., Engelund M., Kolmer M., Zuzak R., Garcia-Lekue A., Novell-Leruth G., Echavarren A.M., Sanchez-Portal D., Joachim C., Saeys M., 2016, ***Diels–Alder attachment of a planar organic molecule to a dangling bond dimer on a hydrogenated semiconductor surface***, *Physical Chemistry Chemical Physics*,18, *16757-16765*

18. Engelund M., Godlewski S., Kolmer M., Zuzak R., Such B., Frederiksen T., Szymonski M., Sanchez-Portal D., 2016, ***The butterfly – a well-defined constant-current topography pattern on Si(001):H and Ge(001):H resulting from current-induced defect fluctuations***, *Physical Chemistry Chemical Physics*, 18, *19309-19317*

19. Godlewski S., Kawai H., Kolmer M., Zuzak R., Echavarren A.M.,Joachim C., Szymonski M., Saeys M., 2016, ***Single-Molecule Rotational Switch on a Dangling Bond Dimer Bearing***, *ACS Nano*, 10 (9), 8499–8507

20. Zuzak R.; Dorel R., Krawiec M., Such B., Kolmer M., Szymonski M., Echavarren A.M., Godlewski S., 2017, ***Nonacene Generated by On-Surface Dehydrogenation***, *ACS Nano*, 11 (9), 9321-9329

21. Soe W.H., Shirai Y., Durand C., Yonamine Y., Minami K., Bouju X., Kolmer M., Ariga K., Joachim C., Nakanishi W., 2017, ***Conformation Manipulation and Motion of a Double Paddle Molecule on an Au(111) Surface***, *ACS Nano*, 11 (10), 10357-10365

22. Kolmer M., Olszowski P., Zuzak R., Godlewski S., Joachim C., Szymonski M., 2017, ***Two-probe STM experiments at the atomic level***, *Journal of Physics Condensed Matter*, 29 (44), 444004

23. Godlewski, S., Engelund M., Peña D., Zuzak R., Kawai, H., Kolmer M., Caeiro J., Guitian E., Vollhardt K.P., Sanchez-Portal D., Szymonski M., Pérez, D., 2018, ***Site-selective reversible Diels-Alder reaction between a biphenylene-based polyarene and a semiconductor surface***, *Physical Chemistry Chemical Physics*, 20(16). 11037-11046

24. Zuzak R., Dorel R., Kolmer M., Szymonski M., Godlewski S., Echavarren A. M., 2018, ***Higher Acenes by On-Surface Dehydrogenation: From Heptacene to Undecacene***, *Angewandte Chemie International Edition*, 57, 10500 –10505

25. Zuzak R., Castro-Esteban J., Brandimarte P., Engelund M., Cobas A., Piatkowski P., Kolmer M., Pérez D., Guitián E., Szymonski M., Sánchez-Portal D., Godlewski S., Peña D., 2018, ***Building a 22-ring nanographene by combining in-solution and on-surface syntheses***, *Chemical Communications*, *54*(73), 10256–10259

26. Kolmer M., Zuzak R., Steiner A.K., Zajac L., Engelund M., Godlewski S., Szymonski M., Amsharov K., 2019, ***Fluorine-programmed nanozipping to tailored nanographenes on rutile TiO_2 surfaces***, *Science*, 363, 57–60

27. Kolmer, M., Brandimarte P., Lis J., Zuzak R., Godlewski S., Kawai H., Garcia-Lekue A., Lorente N., Frederiksen T., Joachim C., Sanchez-Portal D., Szymonski M., 2019, ***Electronic transport in planar atomic-scale structures measured by two-probe scanning tunneling spectroscopy***, *Nature Communications*, 10, 1573

28. Miettinen A. L., Nevius M. S., Ko W., Kolmer M., Li A.-P., Nair M.N., Kierren B., Moreau L., Conrad E.H., Tejeda, A., 2019, ***Edge states and ballistic transport in zigzag graphene ribbons: The role of SiC polytypes***, *Physical Review B*, *100*(4), 045425

29. Ko W., Ma C., Nguyen G.D., Kolmer M., Li, A.-P., 2019, ***Atomic-Scale Manipulation and In Situ Characterization with Scanning Tunneling Microscopy***, *Advanced Functional Materials*, *29*(52), 1903770

30. Briggs N., Bersch B., Wang Y., Jiang J., Koch R.J., Nayir N., Wang K., Kolmer M., Ko W., De La Fuente Duran A., Subramanian S., Dong C., Shallenberger J., Fu M., Zou Q., Chuang Y.-W., Gai Z., Li A.-P., Bostwick A., Jozwiak C., Chang C.-Z., Rotenberg E., Zhu J., van Duin A., Crespi V., Robinson, J.A., 2020, ***Atomically Thin, Half-van der Waals Metals enabled by Confinement Heteroepitaxy***, *Nature Materials*, accepted

III) Book chapters:

1. Krok F., Saeed S.R., Kolmer M., Szymonski M., ***Patterning of ionic insulator surfaces with low-energy ion beams,*** **[in:]** ***Nanofabrication by Ion- Beam Sputtering: Fundamentals and Applications,*** Som T., Kanjilal D. Pan Stanford Publishing, Singapur 2012, 109-131

2. Wojtaszek M., Kolmer M., Godlewski S., Budzioch J., Such B., Krok F., Szymonski M., ***Multi-probe characterization of 1D and 2D nanostructures assembled on Ge(001) surface by gold atom deposition and annealing, [in:] Springer series "Advances in Atom and Single Molecule Machines", vol.1***, Joachim C., Springer-Verlag Berlin Heidelberg 2012, 141-152

3. Kolmer M., Godlewski S., Such B., De Mendoza P., De Leon C., Echavarren A.M., Kawai H., Saeys M., Joachim C., Szymonski M., ***SPM imaging of trinaphthylene molecular states on a hydrogen passivated Ge(001) surface, [in:] Springer series "Advances in Atom and Single Molecule Machines", vol.3***, Joachim C., Grill L., Springer-Verlag Berlin Heidelberg 2013, 105-114

4. Such B., Kolmer M., Godlewski S., Lis J., Budzioch J., Wojtaszek M., Szymonski M., ***Imaging of Defects onGe(001):H by Non-contact Atomic Force Microscopy, [in:] Springer series "Advances in Atom and Single Molecule Machines", vol.6***, Moriarty P., Gauthier S., Springer-Verlag Berlin Heidelberg, 2015, 111-118

5. Sordes D., Thuaire A., Reynaud P., Rauer C., Hartmann J-M., Moriceau H. Rolland E. , Kolmer M., Szymonski M., Durand C., Joachim C. Chéramy C., Baillin X., ***Nanopackaging of Si(100)H Wafer for Atomic-Scale Investigations [in:] On-Surface Atomic Wires and Logic Gates***, Kolmer M., Joachim C., Springer-Nature, 2017, ISBN 978-3-319-51846-6, pp 25-51

6. Kolmer M., Lis J., Szymonski M., ***Atomic Wires on Ge(001):H Surface, [in:] On-Surface Atomic Wires and Logic Gates***, Kolmer M., Joachim C., Springer-Nature, 2017, ISBN 978-3-319-51846-6, pp 53-70

7. Kawai H., Yap T.L., Neucheva O., Kolmer M., Szymonski M., Troadec C., Saeys M., Joachim C., ***Si(100):H and Ge(100):H Dimer Rows Contrast Inversion in Low-temperature Scanning Tunneling Microscope Images, [in:] On-Surface Atomic Wires and Logic Gates***, Kolmer M., Joachim C., Springer-Nature, 2017, ISBN 978-3-319-51846-6, pp 71-82

8. Prauzner-Bechcicki, J.S., Kolmer M., Szymonski M., ***Aryl–Aryl Coupling on Semiconductor Surfaces, [in:] Encyclopedia of Interfacial Chemistry: Surface Science and Electrochemistry***, 2017, http://dx.doi.org/10.1016/B978-0-12-409547-2.13105-1

9. Kolmer M., Prauzner-Bechcicki J.S., ***Aryl-Aryl Covalent Coupling on Rutile TiO2 Surfaces*. *, [in:] On-Surface Synthesis {II}***, de Oteyza D., Rogero C., Springer-Nature, 2018, ISBN 978-3-319-75810-7, pp 153–177