Curriculum Vitae

Personal Data

Name	Dr. rer. nat. Christian Dietz
Date of Birth	July 25th, 1981
Place of Birth	Mellrichstadt, GERMANY

Scientific Education / Positions

Since 05/2011	Supervisor Nanoanalytics Laboratory, Physics of Surfaces, Center of Smart Interfaces, Technische Universität Darmstadt, Group of Prof. Dr. Robert Stark
01/2009 – 04/2011	Postdoc Position, Instituto de Microelectrónica de Madrid (CSIC), Spain, Group of Prof. Dr. Ricardo Garcia
04/2005 – 11/2008	Completion of the PhD Thesis, Chemische Physik, Technische Universität Chemnitz, Group of Prof. Dr. Robert Magerle, Title: *Nanoscale Imaging of Mechanical Properties of Polymeric Materials Using Nanotomography and Scanning Force Microscopy Based Methods*
10/2004 – 03/2005	PhD Thesis, Lehrstuhl Physikalische Chemie II, Universität Bayreuth, Group of Dr. Robert Magerle
10/1999 – 09/2004	University of Applied Sciences Coburg Subject Area: Technical Physics Final Degree: Diplom-Ingenieur (FH) (Engineer) Diploma Topic: *Developement and Optimization of Monocrystalline Actuators with Piezoelectric Excitation* at the Fraunhofer Institute (IPM) in Freiburg

Education

1997 – 1999	Staatl. Fachoberschule Bad Neustadt (Specialized secondary school)
1993 – 1997	Staatl. Realschule Mellrichstadt (Secondary school)
1987 – 1993	Grund- und Teilhauptschule Bastheim (Primary school)

Current Research Interests and Activities

- Nanomechanics and -dynamics of human cells by force spectroscopy
- Nanoscale characterization of functional materials with advanced force microscopy methods
- Development of dynamic force microscopy methods for high-resolution imaging
- Quantification of mechanical properties of polymeric materials and biomaterials on the nanoscale
- Interfacial interactions on the nanoscale
- Micro- and nanoparticle manipulation: determination of interaction forces and dynamic behavior in the liquid environment
- Subsurface detection of magnetic nanoparticles in polymeric samples and biomaterial with magnetic force microscopy
- Visualization of polar nanoregions to study their effects on the macroscopic properties of relaxor ferroelectrics
- High-speed piezoresponse force microscopy for the observation of relaxation processes

Publications in Peer-Reviewed International Journals

1. A. Eichhorn and C. Dietz
Simultaneous Deconvolution of In-Plane and Out-of-Plane Forces of HOPG at the Atomic Scale under Ambient Conditions by Multifrequency Atomic Force Microscopy.
Advanced Materials Interfaces, 2101288 (2021).

2. L. Porz, T. Frömling, A. Nakamura, N. Li, R. Maruyama, K. Matsunaga, P. Gao, H. Simons, C. Dietz, M. Rohnke, J. Janek, and J. Rödel
Conceptual Framework for Dislocation-Modified Conductivity in Oxide Ceramics Deconvoluting Mesoscopic Structure, Core, and Space Charge Exemplified for $SrTiO_3$.
ACS Nano *15*, 9355 (2021).

3. L. Zhang, Y. Pu, M. Chen, F. Zhuo, C. Dietz, and T. Frömling
Decreasing polar-structure size: Achieving superior energy storage properties and temperature stability in $Na_{0.5}Bi_{0.5}TiO_3$-based ceramics for low electric field and high-temperature applications.
Journal of the European Ceramic Society *41*, 5890 (2021)

4. X. Jiang, C. Dietz,* N. Liu, V. Rojas, and R. W. Stark
Ferroelectric Domain Evolution in a $Ba(Zr_{0.2}Ti_{0.8})O_3$-$0.5(Ba_{0.7}Ca_{0.3})TiO_3$ Piezoceramic Studied Using Piezoresponse Force Microscopy.
Applied Physics Letters *118*, 262902 (2021).

5. M. W. Ott, C. Dietz,* S. Trosien, S. Mehlhase, M. J. Bitsch, M. Nau, T. Meckel, A. Geissler, G. Siegert, J. Huong, B. Hertel, R. W. Stark, and M. Biesalski
Co-curing of epoxy resins with aminated lignins: insights into the role of lignin homo crosslinking during lignin amination on the elastic properties.
Holzforschung *75*, 390 (2020).

6. A. Amiri, F. Hastert, and C. Dietz*
Carcinomas with Occult Metastasis Potential: Diagnosis/Prognosis Accuracy Improvement by Means of Force Spectroscopy.
Advanced Biosystems *4*, 2000042 (2020).

7. A. Amiri, F. D. Hastert, L.-O. Heim, and C. Dietz*
Reliability of Cell Elasticity in Force Microscopy
Applied Physics Letter *116*, 083701 (2020).

8. A. Amiri, F. Hastert, L. Stühn, and C. Dietz*
Structural Analysis of Healthy and Cancerous Epithelial Breast Type Cells by Nanomechanical Spectroscopy Allows to Obtain Peculiarities of Skeleton and Junctions
Nanoscale Advances *1*, 4853 (2019).

9. L. Stühn, J. Auernhammer, and C. Dietz*
pH-depended protein shell dis- and reassembly of ferritin nanoparticles revealed by atomic force microscopy
Scientific Reports *9*, 17755 (2019).

10. L. Stühn, A. Fritschen, J. Choy, M. Dehnert, and C. Dietz*
Nanomechanical sub-surface mapping of living biological cells by force microscopy
Nanoscale *11*, 13089 (2019).

11. P. Ren, M. Höfling, S. Lauterbach, X. Jiang, J. Koruza, T. Frömling, D. Khatua, L. Porz, K. Albe, C. Dietz, R. Ranjan, H.-J. Kleebe, and J. Rödel
High Temperature Creep-Mediated Functionality in Polycrystalline Barium Titanate
Journal of the American Ceramic Society *103*, 1891 (2019).

12. S. Schöttner, M. Brodrecht, E. Uhlein, C. Dietz, H. Breitzke, A. A. Tietze, G. Buntkowsky, and Markus Gallei
Amine-Containing Block Copolymers for the Bottom-Up Preparation of Functional Porous Membranes
Macromolecules *52*, 2631(2019).

13. R. Hatada, S. Flege, B. Rimmler, C. Dietz, W. Ensinger, and K. Baba
Surface Structuring of Diamond-like Carbon Films by Chemical Etching of Metallic Inclusions
Coatings *9*, 125 (2019).

14. J. Kredel, C. Dietz, and M. Gallei
Fluoropolymer-Containing Opals and Inverse Opals by Melt-Shear Organization
Molecules *24*, 333 (2019).

15. C. Dietz*
Sensing in-plane nanomechanical surface and sub-surface properties of polymers: local shear stress as function of the indentation depth
Nanoscale *10*, 460 (2018).

16. P. Ruff, C. Dietz, R. W. Stark, and C. Hess
Monitoring the Process of Nanocavity Formation on a Monomolecular Level
Z. Phys. Chem. *232*, 1227 (2018).

17. S. Flege, R. Hatada, A. Derepa, C. Dietz, W. Ensinger, and K. Baba
Note: Sample holder with open area for increased deposition rate in plasma immersion ion implantation and deposition
Review of Scientific Instruments *88*, 096106 (2017).

18. L. M. Riemer, K. V. Lalitha, X. Jiang, N. Liu, C. Dietz, R. W. Stark, P. B. Groszewicz, G. Buntkowsky, J. Chen, S.-T. Zhang, J. Rödel, and J. Koruza
Stress-induced phase transition in lead-free relaxor ferroelectric composites
Acta Materialia *136*, 271 (2017).

19. V. Rojas, J. Koruza, E. A. Patterson, M. Acosta, X. Jiang, N. Liu, C. Dietz, and J. Rödel
Influence of composition on the unipolar electric fatigue of $Ba(Zr_{0.2}Ti_{0.8})O_3$-$(Ba_{0.7}Ca_{0.3})TiO_3$ lead-free piezoceramics
Journal of the American Ceramic Society *100*, 4699 (2017).

20. N. Liu, M. Acosta, S. Wang, B.-X. Xu, R. W. Stark, and C. Dietz*
Revealing the core-shell interactions of a giant strain relaxor ferroelectric $0.75Bi_{1/2}Na_{1/2}TiO_3$-$0.25SrTiO_3$
Scientific Reports *6*, 36910 (2016).

21. S. Schiwek, T. Meckel, R. W. Stark, and C. Dietz*
Evidence of a Rolling Motion of a Microparticle on a Silicon Wafer in a Liquid Environment
Journal of Applied Physics *119*, 194304 (2016).

22. M. F. Bekheet, I. Svoboda, N. Liu, L. Bayarjargal, E. Irran, C. Dietz, R. W. Stark, R. Riedel, and A. Gurlo
Ferroelectric $InMnO_3$: Growth of single crystals, structure and high-temperature phase transitions
Journal of Solid State Chemistry *241*, 54 (2016).

23. C. Rüttiger, M. Appold, H. Didzoleit, A. Eils, C. Dietz, R. W. Stark, B. Stühn, and M. Gallei
Structure Formation of Metallopolymer-Grafted Block Copolymers
Macromolecules *49*, 3415 (2016).

24. D. Scheid, D. Stock, T. Winter, T. Gutmann, C. Dietz, and M. Gallei
The Pivotal Step of Nanoparticle Functionalization for the Preparation of Functional and Magnetic Hybrid Opal Films
Journal of Materials Chemistry C *4*, 2187 (2016).

25. C. Rüttiger, S. Mehlhase, S. Vowinkel, G. Cherkashinin, N. Liu, C. Dietz, R. W. Stark, M. Biesalski, and M. Gallei
Redox-Mediated Flux Control in Functional Paper
Polymer *98*, 429 (2016).

26. S. Vowinkel, C. G. Schäfer, G. Cherkashinin, C. Fasel, F. Roth, N. Liu, C. Dietz, E. Ionescu, and M. Gallei
3D-Ordered Carbon Materials by Melt-Shear Organization for Tailor-Made Hybrid Core-Shell Polymer Particle Architectures
Journal of Materials Chemistry C *4*, 3976 (2016).

27. N. Liu, R. Dittmer, R. W. Stark, and C. Dietz*
Visualization of Polar Nanoregions in Lead-Free Relaxors via Piezoresponse Force Microscopy in Torsional Dual AC Resonance Tracking Mode
Nanoscale *7*, 11787 (2015).

28. S. Schiwek, L.-O. Heim, R. W. Stark, and C. Dietz*
Manipulation of Polystyrene Nanoparticles on a Silicon Wafer in the Peak Force Tapping Mode in Water: pH-Dependent Friction and Adhesion Force
Journal of Applied Physics *117*, 104303 (2015).

29. C. Dietz,* M. Schulze, A. Voss, C. Riesch, and R. W. Stark
Bimodal Frequency-Modulated Atomic Force Microscopy with Small Cantilevers
Nanoscale *7*, 1849 (2015).

30. A. Voss, C. Dietz,* A. Stocker, and R. W. Stark
Quantitative Measurement of the Mechanical Properties of Human Antibodies with Sub-10-nm Resolution in a Liquid Environment
Nano Research *8*, 1987 (2015).

31. M. Acosta, N. Liu, M. Deluca, S. Heidt, I. Ringl, C. Dietz, R. W. Stark, and W. Jo
Tailoring Ergodicity Through Selective A-Site Doping in the $Bi_{1/2}Na_{1/2}TiO_3$–$Bi_{1/2}K_{1/2}TiO_3$ System
Journal of Applied Physics *117*, 134106 (2015).

32. C. G. Schäfer, T. Winter, S. Heidt, C. Dietz, T. Ding, J. J. Baumberg, and M. Gallei
Smart Polymer Inverse-Opal Photonic Crystal Films by Melt-Shear Organization for Hybrid Core-Shell Architectures
Journal of Materials Chemistry C *3*, 2204 (2015).

33. P. Hoffmann, M. Kosinova, S. Flege, J. Brötz, V. Trunova, C. Dietz, and W. Ensinger
Chemical and Physical Properties in Layers and Interfaces of Nanolayered Si(100)/Ni/BC_xN_y Stacks
X-Ray Spectrometry *44*, 48 (2015).

34. A. Voss, R. W. Stark, and C. Dietz*
Surface versus Volume Properties on the Nanoscale: Elastomeric Polypropylene
Macromolecules *47*, 5236 (2014).

35. J. Pinto, M. Dumon, M. Rodriguez-Perez, R. Garcia, and C. Dietz
Block Copolymers Self-Assembly Allows Obtaining Tunable Micro or Nanoporous Membranes or Depth Filters Based on PMMA; Fabrication Method and Nanostructures
The Journal of Physical Chemistry C *118*, 4656 (2014).

36. R. Hatada, S. Flege, A. Bobrich, W. Ensinger, C. Dietz, K. Baba, T. Sawase, T. Watamoto, and T. Matsutani
Preparation of Ag-Containing Diamond-like Carbon Films on the Interior Surface of Tubes by a Combined Method of Plasma Source Ion Implantation and DC Sputtering
Applied Surface Science *310*, 257 (2014).

37. F. Krohm, H. Didzoleit, M. Schulze, C. Dietz, R. W. Stark, C. Hess, B. Stühn, and A. Brunsen
Controlling Polymerization Initiator Concentration in Mesoporous Silica Thin Films
Langmuir *30*, 369 (2014).

38. S. Hörner, S. Fabritz, H. D. Herce, O. Avrutina, C. Dietz, R. W. Stark, C. M. Cardoso, and H. Kolmar
Cube-Octameric Silsesquioxane-Mediated Cargo Peptide Delivery into Living Cancer Cells
Organic & Biomolecular Chemistry *11*, 2258 (2013).

39. A. M. Gigler, C. Dietz,* M. Baumann, N. F. Martinez, R. García, and R. W. Stark
Repulsive Bimodal Atomic Force Microscopy on Polymers
Beilstein Journal of Nanotechnology *3*, 456 (2012).

40. S. Fabritz, S. Hörner, D. Könning, M. Empting, M. Reinwarth, C. Dietz, B. Glotzbach, H. Frauendorf, H. Kolmar, and O. Avrutina
From Pico to Nano: Biofunctionalization of Cube-Octameric Silsesquioxanes by Peptides and Miniproteins
Organic & Biomolecular Chemistry *10*, 6287 (2012).

41. C. Dietz, E. T. Herruzo, J. R. Lozano, and R. Garcia
Nanomechanical Coupling Enables Detection and Imaging of 5 nm Superparamagnetic Particles in Liquid
Nanotechnology *22*, 125708 (2011).

42. D. Martinez-Martin, E. T. Herruzo, C. Dietz, J. Gomez-Herrero, and R. Garcia
Non-Invasive Protein Structural Flexibility Mapping by Bimodal Dynamic Force Microscopy
Physical Review Letters *106*, 198101 (2011).

43. C. Dietz,* M. Zerson, C. Riesch, M. Franke, and R. Magerle
Surface Properties of Elastomeric Polypropylene Studied with Atomic Force Microscopy
Macromolecules *41*, 9259 (2008).

44. C. Dietz,* M. Zerson, C. Riesch, A. M. Gigler, R. W. Stark, N. Rehse, and R. Magerle
Nanotomography with Enhanced Resolution Using Bimodal Atomic Force Microscopy
Applied Physics Letters *92*, 143107 (2008).

45. A. Yurtsever, A. M. Gigler, C. Dietz, and R. W. Stark
Frequency Modulated Torsional Resonance Mode Atomic Force Microscopy on Polymers
Applied Physics Letters *92*, 143103 (2008).

46. C. Dietz,* S. Röper, S. Scherdel, A. Bernstein, N. Rehse, and R. Magerle
Automatization of Nanotomography
Review of Scientific Instruments *78*, 053703 (2007).

47. R. García, C. J. Gómez, N. F. Martínez, S. Patil, C. Dietz, and R. Magerle
Identification of Nanoscale Dissipation Processes by Dynamic Atomic Force Microscopy
Physical Review Letters *97*, 016103 (2006).

Third-Party Funds Raised

- DFG-Sachbeihilfe DI 2176/2-1 (**Project leader**, Project number 318205773): "*Subsurface imaging of magnetic nanoparticles and quantification of nanomechanical properties of polymeric and biological materials by bimodal atomic force microscopy*".
  2016 – 2020 **grand total: 214.100 €**

- DFG-Sachbeihilfe DI 2176/4-1 (**Project leader**, Project number 407750697): "*Investigation of the influence of defects on the nanomechanical properties of graphene by multifrequency atomic force microscopy*"
  Since 2018 **grand total: 221.300 €**

- DFG-Sachbeihilfe DI 2176/6-1 (**Project leader**):
  "*Inter- and intramolecular nanomechanical interactions of homo- and heterogenous polymers*".
  Starting 2021/22 **grand total: 243.526 €**

Other Projects

- Industry-Project with Lam Research AG
  "*Ensor-Project: Removal of polymer and silica micro- and nanoparticles from silicon wafers – Determination of the interfacial interactions and motion behavior"*
  2011 - 2016

Awards

- Prize Winner: Young Investigator Award, *International Scanning Probe Microscopy Conference 2016*, Grindelwald, Switzerland.

Journal Referee

Nature Communications | npj Computational Materials | Nanoscale | Macromolecules
ACS Biomaterials Science & Engineering | Biomacromolecules | Nanotechnology | Langmiur
Physical Chemistry Chemical Physics | Ultramicroscopy | RSC Advances | Polymer Bulletin
Analytical Methods | Journal of Applied Physics | Microscopy and Microanalysis

Referee for Third-Party Fund Proposals

REinforcing Women In REsearch (REWIRE) Fellowship Programme of the University of Vienna, funded by the European Union's Horizon 2020 research and innovation programme under the Marie Skłodowska-Curie grant agreement No 847693.

Oral Contributions at International Conferences

1. VII Multifrequency AFM Conference 2020 (online).
   Organized at Universidad Autonoma de Madrid, Madrid, Spain, October 2020.

   Nanomechanical sub-surface mapping of living biological cells by force microscopy for targeted drug delivery

2. AFM at KIT – Advances in Materials Characterization 2020.
   Karlsruhe Institute of Technology, Karlsruhe, Germany, February 2020.

   Nanomechanical sub-surface mapping of living cells and polymers by force microscopy

3. Cell Physics 2019.
   Universität des Saarlandes, Saarbrücken, Germany, Oktober 2019.

   Nanomechanical sub-surface mapping of living biological cells by force microscopy

4. AFM BioMed Conference.
   Fürstbischöfliches Schloss, Münster, Germany, September 2019.

   Nanomechanical sub-surface mapping of living biological cells by force microscopy

5. XXI Annual Linz Winter Workshop: Advances in Single-Molecule Research for Biology & Nanoscience.
   Johannes Kepler Universität, Linz, Austria, February 2019.

   Nanomechanical sub-surface mapping of cells by atomic force microscopy

6. VII Multifrequency AFM Conference.
   Hotel Eurostars Madrid Tower, Madrid, Spain, April 2018.

   Sensing in-plane nanomechanical surface and sub-surface properties of polymers: local shear stress as function of the indentation depth

7. Materials Science and Engineering Congress.
   Technische Universität Darmstadt, Germany, September 2016.

   Visualization of polar nanoregions in bismuth-alkali-based relaxor ferroelectrics revealed by high-resolution PFM and quantification of the relaxation behavior via high-speed PFM

8. International Scanning Probe Microscopy Conference.
   Sunstar Hotel Grindelwald, Grindelwald, Switzerland, June 2016.

   Visualization of polar nanoregions in bismuth-alkali-based relaxor ferroelectrics revealed by high-resolution PFM and quantification of the relaxation behavior via high-speed PFM

9. V Multifrequency AFM Conference.
   Holiday Inn Hotel Bernabéu, Madrid, Spain, June 2014.

   Surface and Volume Properties of Elastomeric Polypropylene Studied with Enhanced Atomic Force Microscopy Methods

10. MRS Spring Meeting & Exhibit 2013.
    Moscone West, San Francisco, USA, April 2013.

    Surface Properties of Elastomeric Polypropylene Studied with Enhanced Atomic Force Microscopy Methods

11. IV Multifrequency AFM Conference.
    Ayre Gran Hotel Colon, Madrid, Spain, October 2012.

    Repulsive Bimodal Atomic Force Microscopy on Polymers

12. IV International Meeting on AFM in Life Sciences and Medicine.
    Institut Curie, Paris, France, August 2011.

    Nanomechanical Coupling Enables Detection and Imaging of 5 nm Superparamagnetic Particles in Liquid

13. III Multifrequency AFM Conference (local organizer).
    Ayre Gran Hotel Colon, Madrid, Spain, March 2011.

    Nanomechanical Coupling Enables Detection and Imaging of 5 nm Superparamagnetic Particles in Liquid

14. II International Workshop on Advanced Atomic Force Microscopy.
    Karlsruhe Institute of Technology, Karlsruhe, Germany, March 2011.

    Nanomechanical Coupling Enables Detection and Imaging of 5 nm Superparamagnetic Particles in Liquid

15. VIII Seeing at the Nanoscale International Conference.
    Congress Center, Basel, Switzerland, August/September 2010.

    High-Resolution Imaging of Ferritin by Bimodal Magnetic AFM in Liquid

16. XII International Scanning Probe Microscopy Conference.
    Keio Plaza Hotel, Sapporo, Japan, May 2010.

    High-Resolution Imaging of Ferritin by Bimodal Magnetic AFM in Liquid

17. XII Annual Linz Winter Workshop: Advances in Single-Molecule Research for Biology & Nanoscience.
    Johannes Kepler Universität, Linz, Austria, February 2010.

    High-Resolution Imaging of Ferritin by Bimodal Magnetic AFM in Liquid

18. II Multifrequency AFM Conference (local organizer).
    Holiday Inn Hotel, Madrid, Spain, June 2009.

    Bimodal Atomic Force Microscopy of Magnetic Samples

19. VI Seeing at the Nanoscale International Conference.
    Maritim proArte Hotel, Berlin, Germany, July 2008.

    Three-Dimensional Microstructure and Micromechanics of Elastomeric Polypropylene

Invited and Expert Talks

1. VII Multifrequency AFM Conference 2020 (Invited talk).
   Organized at Universidad Autonoma de Madrid, Madrid, Spain, October 2020.

   Nanomechanical sub-surface mapping of living biological cells by force microscopy for targeted drug delivery

2. Advances in Material Characterization using Atomic Force Microscopy (Invited talk).
   Karlsruhe Institut für Technologie, Karlsruhe, Germany, February 2020.

   Nanomechanical sub-surface mapping of living cells and polymers by force microscopy

3. AFM Workshop Featuring Video-Rate AFM (Invited talk).
   Institute of Physics, Technische Universität Chemnitz, Chemnitz, Germany, December 2017.

   Nanoskalige Charakterisierung weicher Materie und funktionaler Materialien mittels höherer Schwingungsmoden des Rasterkraftmikroskops

4. VII Multifrequency AFM Conference (Expert talk).
   Hotel Eurostars Madrid Tower, Madrid, Spain, April 2018.

   Sensing in-plane nanomechanical surface and sub-surface properties of polymers: local shear stress as function of the indentation depth

5. V Multifrequency AFM Conference (Expert talk).
   Holiday Inn Hotel Bernabéu, Madrid, Spain, June 2014.

   Surface and Volume Properties of Elastomeric Polypropylene Studied with Enhanced Atomic Force Microscopy Methods

Teaching Activities

- **Lectures**: Scanning Probe Microscopy in Materials Science (since 2013)
  Solid State Physics / Concepts in Materials Physics (as substitute)
- **Exercises**: Solid State Physics (since 2011), Concepts in Materials Physics

Languages

German: native | **English**: fluent | **Spanish**: basic communication skills