

**Nina Balke**  
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### Education

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| Technical University Darmstadt, Germany | Materials Science | Diploma, 2003 |
| Technical University Darmstadt, Germany | Materials Science | Ph.D., 2006   |

### Professional Experience

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| 2010–p    | Staff scientist, Center for Nanophase Materials Sciences, ORNL  |
| 2009–2010 | Feodor Lynen Fellow, Center for Nanophase Materials Sciences, ORNL  |
| 2007–2009 | Feodor Lynen Fellow, Department of Physics, University of California, Berkeley  |
| 2003–2007 | Research Associate, Non-metallic Inorganic Materials, Institute of Materials Science, Technical University Darmstadt, Germany |

### Professional and Synergistic Activities

- Member at-large of the Center for Nanophase Materials Sciences User Executive Committee at Oak Ridge National Laboratory.
- Reviewer for nine peer-reviewed journals.
- Reviewer for one of the Department of Energy / Office of Science Nanoscale Science Research Centers (NSRC)
- Session chair on EMA (Electronic Materials and Applications) and MRS (Materials Research Society) meetings.
- Symposium organizer for Spring MRS 2012 meeting (CCC: Local probing techniques and in-situ measurements in material sciences).
- Co-editor of the special issue “Scanning Probes of Local Phenomena in Energy Related Materials” for MRS Bulletin published July 2012.

### Honors and Awards

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| 11/2011   | Oak Ridge National Laboratory UT-Battelle Team Award for Scientific Research “for significant contributions in revealing dynamics in energy storage materials through the development of scanning probe methods capable of addressing ionic motion on the nanometer scale”. |
| 08/2011   | Microscopy Today Innovation Award for the development of Electrochemical Strain Microscopy.   |
| 04/2011   | Department of Energy Early Career Research Award for “Spatially resolved ionic diffusion and electrochemical reactions in solids - a biased view at lithium ion batteries”.   |
| 10/2010   | Roland B. Snow award of the American Ceramic Society for the ceramograph “Tracking Li-ion motion on the nanoscale”.   |
| 2007-2011 | Feodor Lynen Fellowship of the Alexander von Humboldt foundation.<br><i>The Feodor-Lynen Fellowship is a long-term research scholarship awarded by the Alexander von Humboldt Foundation which enables German postdocs to conduct research abroad.</i>                      |

**Publications** (Over 39 articles in refereed journals)

## **Research Synopsis**

1. *Local ionic transport in energy storage materials.*  
Investigation Li-ion mobility in battery materials on the nanoscale and its role in battery charging and fading using advanced Scanning Probe Techniques.
2. *Topological defects in ferroelectrics.*  
Deterministic control of ferroelectric switching is used to investigate new topological defects like the vortex domain and its coupling with other order parameters in multiferroic thin films for new device concepts.
3. *Nanoscale ferroelectric switching in thin films.*  
Investigation of domain switching and relaxation in ferroelectric and multiferroic thin films using scanning probe techniques were conducted. The main focuses were the tunability of nano-domain stability in Pb(Zr,Ti)O<sub>3</sub> thin films and domain manipulation in BiFeO<sub>3</sub> using the PFM tip and different electrode configurations.
4. *Degradation mechanisms of actuator materials.*  
The origin and consequences of aging and fatigue under different electrical loads of ferroelectric ceramics were studied. Models for fatigue were developed to explain the measured characteristics of fatigued samples.

## **Graduate and Postdoc Advisors:**

Graduate Advisor: Prof. J. Rödel (Technical University Darmstadt)  
Postdoc Advisors: Prof. R. Ramesh (University of California, Berkeley)  
S. V. Kalinin (Oak Ridge National Laboratory)