### DESCRIPTION

This collection of extended abstracts summarizes the latest research as presented at "Frontiers in Electronic Materials", a Nature conference on correlation effects and memristive phenomena, which took place in 2012.

The contributions from leading authors from the US, Japan, Korea, and Europe discuss breakthroughs and challenges in fundamental research as well as the potential for future applications.

Hot topics covered include:

- Electron correlation and unusual quantum effects
- Oxide heterostructures and interfaces
- Multiferroics, spintronics, ferroelectrics and flexoelectrics
- Processing in nanotechnology
- Advanced characterization techniques
- Superionic conductors, thermoelectrics, photovoltaics
- Chip architectures and computational concepts
ABOUT THE AUTHOR

Joerg Heber is senior editor of Nature Materials. He graduated in physics from the University of Erlangen (Germany), followed by a PhD in solid-state physics from Imperial College in 2000 and post-doc positions at Bell Labs (Murray Hill, NJ) and the University of Marburg (Germany), where he worked on semiconductor materials and optoelectronics. Having joined Nature Materials in March 2005, he handles manuscripts in fields such as condensed matter physics, photonics as well as metallurgy and related areas.

Darrell Schlom is the Hebert Fisk Johnson Professor of Industrial Chemistry in the Department of Materials Science and Engineering at Cornell University. He is currently the chair of the Division of Materials Physics of the American Physical Society (APS). The focus of his research is the heteroepitaxial growth of oxide films by molecular-beam epitaxy. Darrell Schlom has published over 400 papers. He was elected Fellow of both APS and the Materials Research Society (MRS) and received an Alexander von Humboldt Research Fellowship and the MRS Medal.

Yoshinori Tokura is Professor of Applied Physics at the University of Tokyo since 1994. Since 2007, he is also Group Director of RIKEN Advanced Science Institute. He has been investigating transition-metal oxide materials that exhibit strong electron correlation. With his research on giant magnetoelectric responses from multiferroics he extraordinarily contributed to the present knowledge on this topic. Professor Tokura was multiply awarded for his research achievements, among others with the Nishina Memorial Prize, Matthias Prize, Asahi Prize, MacGroddy Prize, and Fujihara Prize for correlated electron research.

Rainer Waser is Professor at the faculty for Electrical Engineering and Information Technology at the RWTH Aachen University and director at the Peter Grünberg Institute at the Forschungszentrum Jülich (FZJ), Germany. His research group is focused on fundamental aspects of electronic materials and on such integrated devices as nonvolatile memories, logic devices, sensors and actuators. Rainer Waser has published about 500 technical papers. Since 2003, he has been the coordinator of the research program on nanoelectronic systems within the Germany national research centres in the Helmholtz Association. In 2007, he has been co-founder of the Jülich-Aachen Research Alliance, section Fundamentals of Future Information Technology (JARA-FIT).

Matthias Wuttig is Professor for Physics of New Materials at the University of Aachen since 1997, and holds a JARA Professorship at Research Centre Jülich & RWTH Aachen since 2011. He served as Dean of the Faculty of Mathematics, Informatics and Natural Sciences, and is Speaker of the strategy board of RWTH Aachen. He has been visiting professor in China, Kenya, USA, and Singapore. His research on phase change memories and organic thin films has been awarded several times, among others with
the Heinz-Maier-Leibnitz Prize of the Ministry for Education and Science, the Gaede-Prize of the German Vacuum Society, and the
Stanford R. Ovshinsky Prize. Since 2009, Matthias Wuttig is Einstein Professor at the Chinese Academy of Sciences.

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