

Semiconducting oxides

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PREFACE

Semiconducting oxides

Guest Editors

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Semiconducting oxides are amongst the most widely studied and topical materials in contemporary condensed matter science, with interest being driven both by the fundamental challenges posed by their electronic and magnetic structures and properties, and by the wide range of applications, including those in catalysis and electronic devices. This special section aims to highlight recent developments in the physics of these materials, and to show the link between developing fundamental understanding and key application areas of oxide semiconductors.

Several aspects of the physics of this wide and expanding range of materials are explored in this special section. Transparent semiconducting oxides have a growing role in several technologies, but challenges remain in understanding their electronic structure and the physics of charge carriers. A related problem concerns the nature of redox processes and the reactions which interconvert defects and charge carriers—a key issue which may limit the extent to which doping strategies may be used to alter electronic properties. The magnetic structures of the materials pose several challenges, while surface structures and properties are vital in controlling catalytic properties, including photochemical processes.

The field profits from and exploits a wide range of contemporary physical techniques—both experimental and theoretical. Indeed, the interplay between experiment and computation is a key aspect of contemporary work. A number of articles describe applications of computational methods whose use, especially in modelling properties of defects in these materials, has a long and successful history.

Several papers in this special section relate to work presented at a symposium within the European Materials Research Society (EMRS) meeting held in Warsaw in September 2010, and we are grateful to the EMRS for supporting this symposium. We would also like to thank the editorial staff of *Journal of Physics: Condensed Matter* for their help in producing this special section. We hope that it conveys some of the excitement and significance of the field.