Preface

This volume on *Oxide Semiconductors for Solar Energy Conversion* follows-up the book on *Solid State Chemistry and Photocatalysis of Titanium Dioxide*, which was published by Trans Tech Publications in 2010. Its contents involved a range of topics related to processing of TiO_2-based photocatalytic systems for partial and total oxidation of water and the theoretical models on solar-to-chemical energy conversion.

The present volume, which considers similar problems, involves the following papers:

1. *Basic Concepts of Solar-to-Chemical Energy Conversion by Oxide Semiconductors* by Alim and Bak,
2. *Oxygen Deficient TiO_2 Photoanode for Photoelectrochemical Water Oxidation* by Yang, Pu, Li and Zhang,
3. *Metal oxide $BiVO_4$ as Photoelectrode in Photoelectrochemical Solar Water Oxidation* by Nasir, Sulaiman, Ebadi, Ludin, Ibrahim, and Mat-Teridi, and
4. *Accelerator-Based Nuclear Techniques for Processing and Characterization of Oxide Semiconductors for Solar Energy Conversion* by Pastuovic, Ionescu, Vittone, and Capan.

The first paper considers the concepts on solar-to-chemical energy conversion by semiconductors based on nonstoichiometric oxides, such as TiO_2 and the related charge transfer. This work shows that the performance of semiconducting oxide materials in solar energy conversion is profoundly influenced by lattice imperfections, such as point defects, and defect-related properties.

The second paper considers the progress in the development of materials for photoelectrochemical water splitting. This work reports a range of approaches in processing oxygen deficient TiO_2 photoanodes, such as hydrogen treatment, thermal annealing, electrochemical reduction, flame reduction and chemical reduction. This paper also considers the use of various approaches in probing the chemical nature and associated charge carrier dynamics of the materials applied as photoelectrodes.

The paper of Nasir *et al.* considers the application of bismuth vanadate, $BiVO_4$, as the promising photocatalyst in photoelectrochemical water splitting. The critical factors influencing the $BiVO_4$-based photoanode properties are discussed.

The paper of Pastuovic *et al.* focusses on the application of the accelerator-based nuclear techniques in the modification and characterization of oxide semiconductors for energy conversion. It is shown that these techniques allow a unique approach in the determination of the performance-related properties, especially the lattice imperfections, such as point defects and defect related properties.

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