

# Preface

This book introduces the basic concepts, synthesis techniques, and applications of vertically-oriented graphene (VG), which has recently attracted growing interest for a wide range of applications due to its unique orientation, exposed sharp edges, non-stacking morphology, and large surface-to-volume ratio. The book summarizes the state-of-the-art research on the synthesis of vertically-oriented graphene nanosheets. Particularly, this book provides a detailed introduction to the plasma-assisted growth of vertically-oriented graphene toward massive industrial production. Emerging applications of vertically-oriented graphene such as biosensors and gas sensors, atmospheric nanoscale corona discharges, supercapacitors, lithium-ion batteries, fuel cells (catalyst support), and solar cells are discussed in this book. The intended readers of this book include upper level undergraduate students, graduate students, and material scientists and researchers.

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Applications of Vertically-Oriented Graphenes,” *Chemical Society Reviews*, 2015 (DOI: [10.1039/C4CS00352G](https://doi.org/10.1039/C4CS00352G)). Our studies on VG could not have been successful without the contributions from many individuals. We thank graduate students, undergraduate students, and postdocs, present and former, in the Nanotechnology for Sustainable Energy and Environment Laboratory at UWM and in the Energy Storage, Nanocatalysis, Plasma Technology Laboratory at Zhejiang University for their well-done work on VG research, and collaborators around the world for fruitful discussions and insightful suggestions. Particularly, we thank Prof. Rodney Ruoff at Ulsan National Institute of Science and Technology (Korea), Prof. Kostya (Ken) Ostrikov at the Commonwealth Scientific and Industrial Research Organisation (Australia), and Dr. Yong Yang at Huazhong University of Science and Technology (China) for productive collaboration. We thank Dr. Shun Mao for helping with the drafting of Chap. 6 and the revision of the entire manuscript.

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