Preface

Organic photovoltaics (OPVs), especially the solution-processable organic photovoltaic materials and devices, have attracted great attention in recent years because of the advantages of simple device structure, low cost, light weight and flexibility of the organic solar cells (OSCs). The highest power conversion efficiency of the OSCs has been improved rapidly, from ca. 3% ten years ago to over 10% at present, by the development of new photovoltaic materials and new device structures. Notably, Chinese scientists have contributed greatly to the achievements in the high efficiency photovoltaic materials and electrode buffer layers for the OSCs. Therefore, we organize this special issue for *Sci China Chem* to report recent research progress from Chinese scientists in this field.

This issue includes 4 highlights, 3 review articles, 1 feature article, 15 research articles and 1 communication. The highlights comment on the recent advances in the record high efficiencies (around 10%) of single junction OSCs based on new conjugated polymer donors, new device structures and new organic small molecule donors respectively. The review articles describe the recent research progress in side chain engineering of high efficiency conjugated polymer photovoltaic materials, plasmonic OPVs and organic-inorganic hybrid perovskite solar cells. The feature

article addresses dynamic photovoltaic processes in OSCs. Of the 15 research articles, 7 are on new conjugated polymer donor materials, 3 on the influence of device fabrication conditions (new electrode buffer layers, mixed solvent treatment and the doping of buffer layer materials into active layer) on photovoltaic performance of the OSCs, 4 on new solution-processable organic small molecule donors, and 1 on new solution-processable organic small molecule acceptors. The communication reports a new fullerene derivative acceptor.

We hope this special issue could provide valuable references to the related researchers and play an active role in promoting the research work on OPVs. Finally, we would like to thank all the authors for their scientific contributions to this special issue and the referees for their careful reviewing of the submitted manuscripts. We also want to thank Dr. Xuemei Zhang from the editorial office of *Sci. China Chem.* for her help in dealing with the manuscripts and organizing this issue.

January 2, 2015

Dr. Yongfang Li has been a professor at the Institute of Chemistry, Chinese Academy of Sciences (ICCAS) since 1993, a professor at the College of Chemistry, Chemical Engineering and Materials Science, Soochow University since 2012, and a Member of Chinese Academy of Sciences since 2013. He obtained his M.Sc in Chemistry from the Eastern China University of Science and Technology in 1982, and his Ph.D. in physical chemistry from Fudan University in 1986. His major research areas include electrochemistry of conducting polymers, and photovoltaic materials and devices for polymer solar cells.

Dr. Yong Cao was appointed Professor at the College of Materials Science and Institute of Polymer Optoelectronic Materials and Devices in the South China University of Technology (China) in 1999, and was elected as a Member of Chinese Academy of Sciences in 2001. He received his B.A. in chemistry from Leningrad University (Russia) and his Ph.D. from Tokyo University (Japan). He has previously been: Professor, Institute of Chemistry, Chinese Academy of Sciences, 1986–1988; Visiting Scientist, Institute of Polymer and Organic Solids, University of California, Santa Barbara, 1988–1990; and Senior Scientist, Uniax Corporation (Santa Barbara), 1990–1999. His current research interest includes optoelectronic conjugated polymers and devices.