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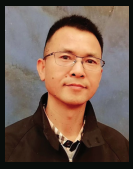
The usage of building energy accounts for 30–40% of total energy consumption in developed countries, exceeding the amount for industry or transportation. Around 50% of energy for building services is contributed by heating, ventilation, and air-conditioning (HVAC) systems. More importantly, both building and HVAC energy consumption are predicted to increase in the next two decades. Windows are considered as the least energy-efficient components of buildings. Therefore, smart windows are becoming increasingly important as they are capable of reducing HVAC energy usage by turning transmitted sunlight in a smart and favoured way: blocking solar irradiation on hot days, while letting it pass through on cold days. Compared with other types of smart windows, thermochromic windows have the unique advantages of cost-effectiveness, rational stimulus, and passive response. This book covers fabrication of vanadium dioxide–based smart windows, discusses various strategies to enhance their performance, and shares perspectives from top scientists in this particular field. It is the first book dedicated to this specific area that can well serve as a textbook for young researchers interested in solving the biggest problems of window energy consumption and, more importantly, inspire fresh ideas in and facilitate the commercialization of this particular technology.

Yi Long is a senior lecturer in the School of Materials Science and Engineering at Nanyang Technological University, Singapore. She obtained her PhD from the University of Cambridge, UK. Her research focuses on nanostructured functional materials for different applications. She has successfully implemented technology transfer from lab to industry for hard-disk companies in her early career. Her recent research is focused on developing various functional materials by manipulation of structure at the nanoscale to achieve unusual properties and focus on energy-saving windows, flexbile electronics, and smart devices. Her work has been widely highlighted in top journals and different media.



Yanfeng Gao is the group leader of light/thermal modulated materials at Shanghai University. From 2004 to 2012, he worked at the Shanghai Institute of Ceramics, Chinese Academy of Sciences, Musashi Institute of Technology, and Nagoya University. Dr. Gao has published over 190 journal papers and filed over 100 patents. He is a recipient of the prestigious Changjiang Scholar Award and the National Science Fund for Distinguished Young Scholars.

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