

PREFACE

## Gallium nitride electronics

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## PREFACE

# Gallium nitride electronics

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In the past two decades, there has been increasing research and industrial activity in the area of gallium nitride (GaN) electronics, stimulated first by the successful demonstration of GaN LEDs. While the promise of wide band gap semiconductors for power electronics was recognized many years before this by one of the contributors to this issue (J Baliga), the success in the area of LEDs acted as a catalyst. It set the field of GaN electronics in motion, and today the technology is improving the performance of several applications including RF cell phone base stations and military radar. GaN could also play a very important role in reducing worldwide energy consumption by enabling high efficiency compact power converters operating at high voltages and lower frequencies.

While GaN electronics is a rapidly evolving area with active research worldwide, this special issue provides an opportunity to capture some of the great advances that have been made in the last 15 years. The issue begins with a section on epitaxy and processing, followed by an overview of high-frequency HEMTs, which have been the most commercially successful application of III-nitride electronics to date. This is followed by review and research articles on power-switching transistors, which are currently of great interest to the III-nitride community. A section of this issue is devoted to the reliability of III-nitride devices, an area that is of increasing significance as the research focus has moved from not just high performance but also production-worthiness and long-term usage of these devices. Finally, a group of papers on new and relatively less studied ideas for III-nitride electronics, such as interband tunneling, heterojunction bipolar transistors, and high-temperature electronics is included. These areas point to new areas of research and technological innovation going beyond the state of the art into the future.

We hope that the breadth and quality of articles in this issue will make it an excellent reference for newcomers and experienced researchers in this field for several years. We thank Alice Malhador at IOP Publishing for her constant encouragement and guidance in putting together this special issue on GaN electronics.