Atomic Layer Deposition Applications 12

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Preface

The papers included in this issue of *ECS Transactions* were originally presented in the symposium "Atomic Layer Deposition Applications, 12", held during the PRiME 2016 joint international meeting of The Electrochemical Society (ECS), The Electrochemical Society of Japan, and the Korean Electrochemical Society, with the technical co-sponsorship of the Chinese Society of Electrochemistry, the Electrochemistry Division of the Royal Australian Chemical Institute, the Japan Society of Applied Physics, the Korean Physical Society Semiconductor Division, and the Semiconductor Physics Division of the Chinese Physics Society. The 2016 PRiME conference took place at the Hilton Hawaiian Village and Hawaii Convention Center in Honolulu from October 2 to 7, 2016, and attracted well over 4,000 participants.

Held every four years, the PRiME meeting is the largest and most significant Pacific Rim conference in the world and serves as a major forum for the discussion of interdisciplinary research with focus on electrochemical and solid-state science and technology. Scientists, engineers, and industry leaders come from around the world to attend the technical symposia, poster sessions, panel discussions, professional development workshops, to participate in the Free the Science 5km Run, and take part in the networking and social events offered throughout the course of the meeting.

Atomic Layer Deposition enjoys an ever growing acceptance by the nano-electronics manufacturing industry. But also for other industries (solar, energy storage, etc.) a rapidly expanding variety of application fields is emerging for commercialization. Many of these applications have been reviewed in this annual symposium, which was the twelfth in this ECS series. Its main objective is to address the latest advances in ALD-based applications. The applications list ranges from plasma enhancement used for high process rate and large-area manufacturing to energy-related applications, templated and area-selective ALD, novel materials and processes and related characterization, and metal deposition and applications. One distinct trend is in the related and rapidly emerging topic of Atomic Layer Etching (ALE). Only recently the ALE technique has been recognized by the electronics industry as an option absolutely needed to uphold the pace of scaling nanoelectronics beyond the 7-nm technology nodes. Recently, in 2015, ECS anticipated timely on the emergence of this technology by dedicating a special Focus Issue on Atomic Layer Etching and Atomic Layer Cleaning in their *ECS Journal of Solid State Science and Technology*, volume 4, issue 6, with contributions from leading research groups in industry and institutes, and most articles are available via Open Access at http://jss.ecsdl.org/content/4/6.

The papers in this issue of *ECS Transactions* cover over half of the presentations given at this symposium. These papers are arranged in several sections. The first chapter on ALD topics in plasma-enhanced processing, followed by Chapter 2 on energy storage applications, and Chapter 3 on templated and area-selective ALD. Next, Chapter 4 covers topics in energy conversion and Chapter 5 discusses the steadily growing area of new materials and processes. Chapter 6 is on characterization, followed by Chapter 7 on general applications. This issue is concluded by the poster presentations in Chapter 8.

We convey special thanks to all speakers, invited and contributing, for their continued interest in this symposium, and for submitting high-quality abstracts and preparing their manuscripts in time. We conclude by stating that the success of the symposium is greatly and positively influenced by the financial support given this year

by the following industrial sponsors: Gelest, Lam Research, Mattson Technology Inc., Picosun Oy, RASIRC and Tokyo Electron (TEL). Their support and loyal sponsorship are much appreciated. Also, the support of the EPD division and the DST division of The Electrochemical Society is gratefully acknowledged.

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Facts about ECS

The Electrochemical Society (ECS) is an international, nonprofit, scientific, educational organization founded for the advancement of the theory and practice of electrochemistry, electronics, and allied subjects. The Society was founded in Philadelphia in 1902 and incorporated in 1930. There are currently over 7,000 scientists and engineers from more than 70 countries who hold individual membership; the Society is also supported by more than 100 corporations through Corporate Memberships.

The technical activities of the Society are carried on by Divisions. Sections of the Society have been organized in a number of cities and regions. Major international meetings of the Society are held in the spring and fall of each year. At these meetings, the Divisions and Groups hold general sessions and sponsor symposia on specialized subjects.

The Society has an active publication program that includes the following:

Journal of The Electrochemical Society — (JES) is the leader in the field of electrochemical science and technology. This peer-reviewed journal publishes an average of 550 pages of 85 articles each month. Articles are published online as soon as possible after undergoing the peer-review process. The online version is considered the final version and is fully citable with articles assigned specific page numbers within specific issues. The date of online publication is the official publication date of record.

Journal of Solid State Science and Technology — (JSS) is one of the newest peer-reviewed journals from ECS launched in 2012. JSS covers fundamental and applied areas of solid state science and technology including experimental and theoretical aspects of the chemistry and physics of materials and devices. Articles are published online as soon as possible after undergoing the peer-review process. The online version is considered the final version and is fully citable with articles assigned specific page numbers within specific issues. The date of online publication is the official publication date of record.

Electrochemistry Letters — (EEL) is one of the newest journals from ECS launched in 2012. It is dedicated to the rapid dissemination of peer-reviewed and concise research reports in fundamental and applied areas of electrochemical science and technology. Articles are published online as soon as possible after undergoing the peer-review process. The online version is considered the final version and is fully citable with articles assigned specific page numbers within specific issues. The date of online publication is the official publication date of record.

Solid State Letters — (SSL) is one of the newest journals from ECS launched in 2012. It is dedicated to the rapid dissemination of peer-reviewed and concise research reports in fundamental and applied areas of solid state science and technology. Articles are published online as soon as possible after undergoing the peer-review process. The online version is considered the final version and is fully citable with articles assigned specific page numbers within specific issues. The date of online publication is the official publication date of record.

Electrochemical and Solid-State Letters — (ESL) was the first rapid-publication electronic journal dedicated to covering the leading edge of research and development in the field of solid-state and electrochemical science and technology. ESL was a joint publication of ECS and IEEE Electron Devices Society. Volume 1 began July 1998 and contained six issues, thereafter new volumes began with the January issue and contained 12 issues. The final issue of ESL was Volume 16, Number 6, 2012. Preserved as an archive, ESL has since been replaced by SSL and EEL.

Interface— *Interface* is an authoritative yet accessible publication for those in the field of solid-state and electrochemical science and technology. Published quarterly, this four-color magazine contains technical articles about the latest developments in the field, and presents news and information about and for members of ECS.

ECS Meeting Abstracts— *ECS Meeting Abstracts* contain extended abstracts of the technical papers presented at the ECS biannual meetings and ECS-sponsored meetings. This publication offers a first look into the current research in the field. ECS Meeting Abstracts are freely available to all visitors to the ECS Digital Library.

ECS Transactions— (ECST) is the online database containing full-text content of proceedings from ECS meetings and ECS-sponsored meetings. ECST is a high-quality venue for authors and an excellent resource for researchers. The papers appearing in ECST are reviewed to ensure that submissions meet generally-accepted scientific standards. Each meeting is represented by a volume and each symposium by an issue.

Monograph Volumes — The Society sponsors the publication of hardbound monograph volumes, which provide authoritative accounts of specific topics in electrochemistry, solid-state science, and related disciplines.

For more information on these and other Society activities, visit the ECS website:

www.electrochem.org