

Preface

The International Symposium on Ultra Clean Processing of Semiconductor Surfaces (UCPSS) is a bi-annual conference organized by IMEC since 1992. The scope of the symposium includes all issues related to contamination, cleaning and surface preparation in mainstream large-scale Integrated Circuit manufacturing. For the first editions, typically silicon was the main semiconductor of interest.

The scope was broadened to cleaning of other surfaces, such as isolating layers and metal interconnects and other semiconducting materials, such as SiGe and SiC, Ge and III-V, that are being considered for future generation devices. Over the last 50 years, the industry of electronic integrated circuit fabrication has steadily grown to a large major mature economic activity. The application of integrated circuit technology has diverged into new applications besides mere digital circuits, such as image sensors and various life-science devices that are all in the scope of the conference. Parallel to the fast moving CMOS industry also the photovoltaic industry has recognized the need for improvements in cleaning as a necessity for enhancing the power efficiency.

The subject matter of this conference may be very specific, the fundamental and technological aspects can be applied in many other fields. The knowledge can be extended to cleaning and surface preparation of other materials and for different applications (numerous, consumer cleaning applications, optical surfaces, surface modification, surface wetting and adhesion, coating, life science, food industry...) and even much broader to any field where the interface between a fluid and surface plays an important role (lubrication, corrosion, glueing, bonding ..).

The fourteenth international symposium on Ultra Clean Processing of Semiconductor Surfaces (UCPSS 2018) was held in Leuven, Belgium on September 3-5. The symposium was preceded by a tutorial session, given on September 2nd by the following experts: Eddy Simoen (Univ. Gent), Philippe Garnier (STMicroelectronics), Paul Mertens (imec), Anthony Muscat (Univ. Arizona), Karolien Jans (imec).

The final remaining result of an edition of UCPSS is its proceedings. It is the collective recording of the conference available for consultation in the future. The proceedings of all editions of UCPSS are a rich source of specialized information on the subject matter. The structured format allows one to quickly find information on any specific subject. As such these proceedings provide the benchmark and foundation of new developments. Therefore we believe one cannot spend enough care and attention to this aspect of the conference.

This symposium proceedings volume consist of 54 papers comprising 2 invited papers. It contains all contributing presentations, with only 2 other invited presentations not being incorporated. It covers different aspects of ultra-clean technology for large scale integration on semiconductors, cleaning and contamination control in both the front- end-of-line (FEOL) and the back-end-of-line (BEOL) processing as well as cleaning for semiconductor photo-voltaic applications. This includes studies on general topics such as removal of contaminants (of different nature: particles, metallic,..) pattern collapse of fine flexible and fragile features, wetting and drying, contamination control and contamination metrology. FEOL and BEOL contributions cover: surface chemistry of silicon and other semiconductors, cleaning related to new gate stacks, cleaning at the interconnect level, resist strip and polymer removal, cleaning and contamination control for various new materials and cleaning after Chemical-Mechanical-Polishing (CMP).

At this meeting experts from all over the world gather, with a representation from most of the leading cleaning chemical suppliers and the equipment manufacturers and almost all leading integrated device manufacturers as well as staff from academia and R&D-centers. The attendance is an indication of the interest in the topic and the huge cleaning challenges in future technologies. The symposium fosters also the participation of (PhD-) students. A student paper contest was organized and 2 outstanding student contributions and one best student paper were selected.

A conference comes together with the commitment and efforts of many. We like to thank all the authors to submit their results for publication in this conference. For the current volume each paper has been peer-reviewed by 2 reviewers (see review committee below). The reviewers were encouraged to provide constructive review feedback. Many authors acknowledged how the positive inputs enabled them to improve the quality of their papers significantly. We like to thank all reviewers to fulfill their tasks with great care and precision within a very tight time frame imposed to get the proceedings ready at the start of the symposium. For the first time this editing process ran fully under the control of the online software of the publisher *Scientific*. The staff members of the publishing company, have been very flexible and cooperative, which is very much appreciated by the authors, reviewers and the editors.

We believe UCPSS and similar symposia contribute significantly to the search for new solutions to new challenges. In this perspective we invite you to the 15th edition of this symposium to be held in 2020. Updated information concerning future and past editions of this symposium can be found on www.ucpss.org.

Paul Mertens, Marc Meuris and Marc Heyns Proceeding editors

Committees

Conference Chairman

Paul W. Mertens (imec)

Programme Committee

Mauro Alessandri (STMicroelectronics)
Lucile Broussous (STMicroelectronics)
Geunmin Choi (SK Hynix)
Takeshi Hattori (Hattori Consulting International)
Kuntack Lee (Samsung)
Paul Mertens (imec)
Anthony Muscat (University of Arizona)
Ara Philipossian (University of Arizona)
Jef Poortmans (imec)
Jochen Rentsch (Fraunh. Inst. Sol. En. Syst.)
Jerzy Ruzyllo (Penn State University)

Scientific Advisory Committee

Marc Heyns (imec)
Bernd Kolbesen (J.-W. Goethe University)

Local Organizing Committee

Marc Heyns (imec)
Paul Mertens (imec)
Marc Meuris (imec)
Antoine Pacco (imec)
Guy Vereecke (imec)
Rita Vos (imec)
Kurt Wostyn (imec)

Logistic Support

Kathleen Vanderheyden (imec)
Fred Loosen (imec)
Annemie Kumps (imec)
Marie-Laure Bettens (KULeuven)

Review Committee

Anthony Muscat (Univ. Arizona),
Takeshi Hattori (Hattori Consulting International),
Ara Philipossian (Univ. Arizona),
Lucile Broussous (STMicroelectronics),
Paul Mertens (imec),
Francesco M. Pipai (STMicroelectronics),
Saga Koichiro (Sony),
Anamaria Moldovan (Fraunh. Inst. Sol. En. Syst.),
Simon Braun (imec),
Toan Le Quoc (imec)
Steven Brems (imec)
Guy Vereecke (imec)
Rita Vos (imec)
Kurt Wostyn (imec)
Dennis van Dorp (imec)
Antoine Pacco (imec)

Sponsors

This symposium has been financially supported by the following companies:

Major Sponsors:

		
		
		

Contributors:

		
		