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INFO for AUTHORS and PRESENTERS

47th MNE Conference

WELCOME

MNE2021 will be the 47th International Conference in a series that started in Cambridge in 1975, and was held most recently in Braga (2017), Copenhagen (2018) and Rhodes (2019).

The MNE2020 conference in Leuven had to be cancelled because of the COVID-19 outbreak, but we are now building a new fantastic edition in Torino which will represent for micro and nano engineers and scientists the best showcase for the technology advancement achieved over the last two years.

Micro and Nano Engineering (MNE) is the flagship event of the international Micro and Nano Engineering society (iMNEs) and the premium international conference on:

- micro/nanofabrication and manufacturing techniques
- application of micro/nanostructures, devices and microsystems into electronics, photonics, energy, environment, chemistry and life sciences.
The MNE 2021 edition returns to Italy, after 11 years, and it will be hosted for the first time in the beautiful and charming Torino, the capital of the Piedmont Region located in the north-west of Italy. Torino, surrounded on the West and North by the Alps and on South by the famous Langhe hills, is famous for its architectural masterpieces (castles, noble palaces, and museums) and enogastronomy, with red wines, chocolate and cheese among its excellences.

The 3-day conference format includes 3 parallel sessions, plenary talks, invited presentations, oral and poster presentations (evaluated by the International Program Committee), an industrial session and a commercial exhibition. MNE poster papers have equal weight to oral presentations. The MNE Committees encourage authors to submit papers (regular, accelerated publications, reviews or news and opinions) to 4 thematically focused open access issues of Elsevier Micro and Nano Engineering related to the conference topics. Elsevier also sponsors the annual Young Investigator Award, which will be presented at the conference. MNE has two sister conferences (EIPBN) in the USA, and (MNO) in Japan.

Massimo De Vittorio (MNE 2021 General Chair)
Fabrizio Pirri (MNE2021 co-Chair)
We investigated the replication of nanostructures inspired by the nanoscale features that are responsible for the metallic-blue structural color of the Morpho butterfly [1]. Due to the fact, that these are complex structures with undercut features the replication of such structures using nanoimprinting processes [2] is non-trivial but still highly interesting since it would enable a fast and cost-effective process without the need for vacuum-based processes [3]. Starting with single layer structures (“T-shaped”) we developed the basics of the process incl. the nanoimprint material for imprint and stamp. Finally, we were able to replicate multilayer structures (“tree-shaped”).

Mastering of the single and multilevel structures was performed using semiconductor-based processes and either electron-beam lithography or phase transition mastering [4]. For the single layer undercut structures phase transition mastering with a wet chemical underetching process was used. For the tree-shaped multilayer structures a multi-layer stack of e.g. Si/SiO\(_2\) and laterally structured using a Gold hardmask. The subsequent reactive ion etching process was tuned in such a way that the two materials Si and SiO\(_2\) were not etched in the same way thus creating a lateral undercut (Figure 1).

Using these masters first a stamp was fabricated which was then again used for nanoimprinting [5]. A special UV-curable material was formulated which can be used for both the stamp as well as for the final imprint. Figure 2 shows the SEM images of master, stamp and imprint for the T-shaped structures. As can be seen, the details of the master (slight tapering angle of the T-crossbar e.g.) are very well replicated throughout the imprinting process. Figure 3 shows the same master – stamp – imprint sequence for the multilayer structures. The cross-sectional SEM images were prepared using cryo-microtome cutting to preserve the delicate features.

We showed that it is possible to replicate complex undercut bio-inspired nanostructures using a specially designed stamp- and nanoimprint material. This opens up new possibilities for nanoimprint processes for complex structures.

We acknowledge funding from the rollerNIL project (FFG, grant 843639).

Figure 1. Left: cross sectional SEM image of a multilayer (tree-shaped) master structure. Right: schematic of the layer sequence used for the sample shown left.

Figure 2. SEM images of the single-layer sample sequence: from left to right: master-stamp-imprint

Figure 3. SEM images of the multi-layer sample sequence: from left to right: master-stamp-imprint
PA60-Replication of biomimetic, multilevel undercut nanostructures using UV-based Nanoimprinting

- Dr. Michael Mühlberger1, Mr. Stephan Rutloff1, Dr. Dieter Nees2, Mr. Amiya Moharana2, Dr. Maria Belegrat12, Mr. Philipp Taus1, Prof. Heinz Wanzenboeck1, Ms. Sonja Kopp1, Mr. Patrick Schuller1, Mr. Anton Tsevno1, Mr. Markus Schinner1, Dr. Mostafa Shawaw1, Dr. Michael Haslinger1, Dr. Adrian Prinz1, Dr. Daniel Fechtig1 (1. Profactor GmbH, 2. JOANNEUM RESEARCH Forschungsgesellschaft mbH, 3. TU Wien, 4. ams AG, 5. Stratec Consumables GmbH)

PA62-Atlas 46 – novel negative tone photoresist similar to SU-8 with a temperature sensitive removal option

- Dr. Benjamin Schille1, Dr. Armaghan Fakhouri1, Mr. Matthias Schirmer1, Dr. Maik Gergroß1, Dr. Mandy Grube1, Dr. Andreas Winkler1 (1. Allresist GmbH, 2. Leibniz Institute for Solid State and Material Research (IFW))

PA64-Flexible Graphene – based inkjet - printed heaters

- Mr. Dimitris Barmakos1, Prof. Vassilki Belessi2, Mr. Rayner Schellwald1, Prof. Grigoris Kaltsas1 (1. microSENSES Laboratory, Department of Electrical and Electronics Engineering, University of West Attica, 2. Department of Graphic Design and Visual Communication, Graphic Arts Technology Study Direction, University of West Attica, 3. Filmetrics, A KLA Company)

PA66-Terahertz Polarization Modulation with 3D helix metamaterial

- Mr. Yonggang Piao1, Dr. Zhongyang Bai1, Mr. Haowei Sun2, Prof. Youguang Zhang1, Prof. Tianxie Nie1, Prof. Xiaojun Wu1, Prof. Lianggong Wen1 (1. School of Integrated Circuit Science and Engineering, Beihang University, 2. School of Electrical Information Engineering, Beihang University)

PA68-Angiogenesis biomarkers detection on a polymeric 3D printed device

- Dr. Gianluca Palmara1, Dr. Alessandro Chiado1, Dr. Annalisa Chiappone1, Prof. Fabrizio Pirri1, Dr. Ignazio Roppolo1, Dr. Francesca Frascella1 (1. Politecnico di Torino, 2. Applied Science and Technology Department, Politecnico di Torino, Torino, 10129, Italy)

E2021 - 47th international conference on Micro and Nano Engineering 20 - 23 Sep 2021

PA70-Stability Considerations for Isolated and Dense High Aspect Ratio Nanopillars Replicated by UV Nanoimprint Lithography

- Mr. Oliver Maier1, Dr. Michael Haslinger2, Dr. Michael Mühlberger2, Mr. Markus Pribyl2, Mr. Philipp Taus1, Prof. Heinz Wanzenboeck1, Dr. Elena Guillen1 (1. Pr. 2. Profactor GmbH, 3. TU Wien)

PA72-Impacts of different carrier wafers during Cl2 Inductively Coupled Plasma etching on the GaN surface and the Al2O3/GaN Interface

- Dr. Thibaut Meyer1, Dr. Sarah Boubena1, Dr. Bassem Salem1, Dr. Camille Petit-Etienne1, Dr. Erwine Pargot1 (1. Université Grenoble Alpes, CNRS, LTM, F-38000 Grenoble, France)

PA74-Focused Ion Beam Milling of Silicon by LMIS and LMAIS sources: comparison between Au+ and Ga+ processes.

- Mr. Damiano Giubortoni1, Dr. Shyamal Mondal1, Mr. Alessandro Cian1, Mr. Mario Barozzi1, Mr. Elia Scattol1, Mr. Roberto Canterl1, Dr. Lia Emanuela Vanzetti1, Dr. Achim Nadzeyka1, Dr. Bjorn Wittmann1, Dr. Torsten Richter1, Dr. Pierluigi Bellutti1 (1. FBK, Bruno Kessler Foundation, 2. Raith gmbh, 3. Fondazione Bruno Kessler)

PA76-Simulation and process design of direct-write laser grayscale exposure on thick photosensitive positive resists

- Ms. Gerda Ekkindorf1, Mr. Dominique Collé1, Dr. Peter Heyl1, Mr. Daniel Ritter1, Mr. Thomas Michels1 (1. Heidelberg Instruments, 2. GenlSYS GmbH)

PA78-Superhydrophobic nanostructured metallic surfaces for enhanced heat transfer

- Mr. Panagiotis Sarkiris1, Dr. Konstantinos Elinas2, Dr. Evangelos Gogolides3 (1. National technical University of Athens, Athens, 15780, Greece, 2. Institute of Nanoscience and Nanotechnology, NCSR Demokritos, 3. NTUA Demokritos)

PA80-Edge-contact MoS2 transistors made by thermal scanning probe lithography

- Dr. Ana Conde-Rubio1, Dr. Xia Liu1, Dr. Giovanni Boero1, Prof. Jürgen Brugger1 (1. Ecole Polytechnique Federale de lausanne (EPFL))