Technical University of Denmark

Injection Molding of High Aspect Ratio Nanostructures

Matschuk, Maria; Larsen, Niels Bent

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P-MEMS-024 – Injection Molding of High Aspect Ratio Nanostructures

Maria Matschuk [1], Niels Bent Larsen [1]

[1] DTU Nanotech, Technical University of Denmark, Kongens Lyngby/Denmark

We present a process for injection molding of 40 nm wide and >100 nm high pillars (pitch: 200 nm). We explored the effects of mold coatings and injection molding conditions on the replication quality of nanostructures in cyclic olefin copolymer. We found that optimization of molding parameters using native nickel molds only lead to slight improvements in replication quality. In contrast, a fluorocarbon based antistiction coating (FDTS) was found to improve the replication quality significantly.

P-MEMS-025 – Irregular film thickness distribution in C4F8 inductively coupled plasma polymer deposition

Burkhard Volland [1], Maik Hauguth [1], Valentyn Ishchuk [1], Ivo W. Rangelow [2]

[1] Technische Universität Ilmenau, Ilmenau/Germany, [2] Ilmenau, University of Technology, Ilmenau/Germany

Under certain process conditions, plasma polymerization of fluoro-carbons on structured silicon samples shows two distinctive effects: First, the growth rate at a certain depth inside the trenches is considerably larger than at the shoulders, the trench bottom or other areas of the sidewall. Second, an initial sidewall texture is enlarged in the shape of the deposited polymer film

P-MEMS-026 – Laser-Scanning Imprinting for Large-Area Nanostructures

Toshimi Sato [1]

[1] The University of Tokyo, Tokyo/Japan

Laser-assisted imprinting, a high-throughput method of imprinting, was demonstrated; however, scanning a laser is needed to imprint a large area because the power of the laser has a limitation. In this study, we demonstrate a laser-scanning imprinting for a large-area nanostructured film. We successfully imprinted 500-nm-pitch pattern on a spot area, a line area with a speed of 10 mm/s, and an area with a size of 10×10 mm2 in 12 s.

P-MEMS-027 – Nano and microstructuring of industrial-scale surfaces using colloidal lithography

Anne Gry Hemmersam [1], Jacob Ask Hansen [2], Troels Bach Nielsen [1], Inge Hald Andersen [1]

[1] Danish Technological Institute, Aarhus C/Denmark, [2] The Danish Technological Institute, Aarhus C/Denmark

Through the last decades, nano and microstructuring of surfaces has been an active research area resulting in the fabrication of increasingly complex surface structures with novel properties. Here we pressent two methodes for nano and micro structuring 3D industrial surface based on colloidal lithography. Surface coverage of the microstructure can be varried between 1-55%. The surfaces are tested for improved heat transfer using water as a colling liquid.

P-MEMS-028 – Plasma Induced Self-Aligned Double Patterning

lei chen [1]

[1] National Institute of Standards and Technology, Gaithersburg/United States

In this paper, a simple self-aligned double patterning process (SADP) based on plasma deposition and etching is introduced. Plasma induced sidewall re-deposition was carried out in etching chamber on patterned resist. The deposited sidewall is resistant to O2 plasma, therefore initial resist can be removed to retain the sidewall structures. Both doubled frequency gratings and nano-rings have been successfully demonstrated.

P-MEMS-029 – Precise fabrication of copper micro-coils using dissociation etching

Toshiyuki Horiuchi [1], Hidetoshi Ishii [1]

[1] Tokyo Denki University, Tokyo/Japan

Copper micro-coils with a diameter of 100 μm, homogeneous coil widths of 55±2.1 μm were constantly fabricated using dissociation etching in aqueous solution of sodium chloride and ammonium chloride. In conventional chemical etching, coil widths often fluctuated terribly, and had to be controlled by observing the coils on the way of etching. Applying the new etching, coil widths became homogeneous without the halfway observation. In addition, etching time was shortened to about 1/4.

P-MEMS-030 – Process Optimization and Simplification of Self-aligned Triple Patterning

Yijian Chen [1]

[1] Peking University Shenzhen Graduate School, Shenzhen/China

Self-aligned triple patterning (SATP) offers both improved resolution and design flexibility for scaling IC down to sub-15nm half pitch. SATP technology is a prospective trend that not only increase the feature density, but also relaxes the overlay requirement and allows 2D layout. Further optimization and simplification of SATP process is needed to compete with SAQP (4x) and EUV+SADP schemes. We shall discuss several key issues in SATP process optimization & simplification and mandrel etching.

P-MEMS-031 – Relatively large polyimide microstructures fabricated using hot embossing

Ryuta Ikoma [1], Hiroki Komatsuzaki [1], Kenta Suzuki [1], Takayuki Komori [1], Keigo Kuroda [1], Hirohumi Saitou [1], Sung-won Youn [1], Masaharu Takahashi [1], Ryutaro Maeda [1], Yasushiro Nishioka [1]

[1] Nihon University, Chiba/Japan

Polyimide has many advantages for MEMS applications. However, it has been difficult to define relatively large micro-patterns on/polimide surfaces. This paper presents optimized hot embossing processes to fabricate a micropump patterns with the dimensions larger than 100 μm and the depth of 200 μm on a 300 μm-thick PI film. Good shapes of the micropump structures were projected to the PI substrate using anti-adhesion coating on the mold at 350Λduring hot embossing.