

2018 Micro-Nano Graph

----- Contest -----

Title: Castle made of glass

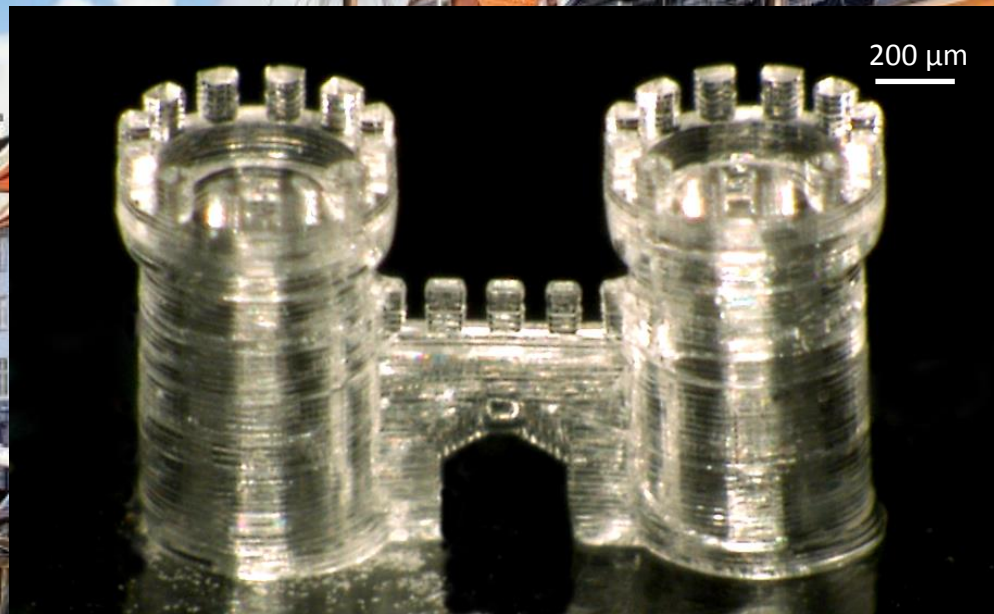
Description: 3D printed fused silica glass microcastle gate. A silica nanocomposite was printed using stereolithography and turned into fused silica glass via a thermal heat treatment (Kotz et al., Nature, 2017).

Submitted by: Frederik Kotz

Affiliation: Karlsruhe Institute of Technology (KIT)

Instrument: Keyence VH-S30K

Magnification: 50x



2018 Micro-Nano Graph

----- Contest -----

Honorable Mention

Austrian winter landscape at night,
After a couple of wines and schnaps

Crystallized proteins and salts on
a stamp for nanocontact printing.
Should be homogeneous.

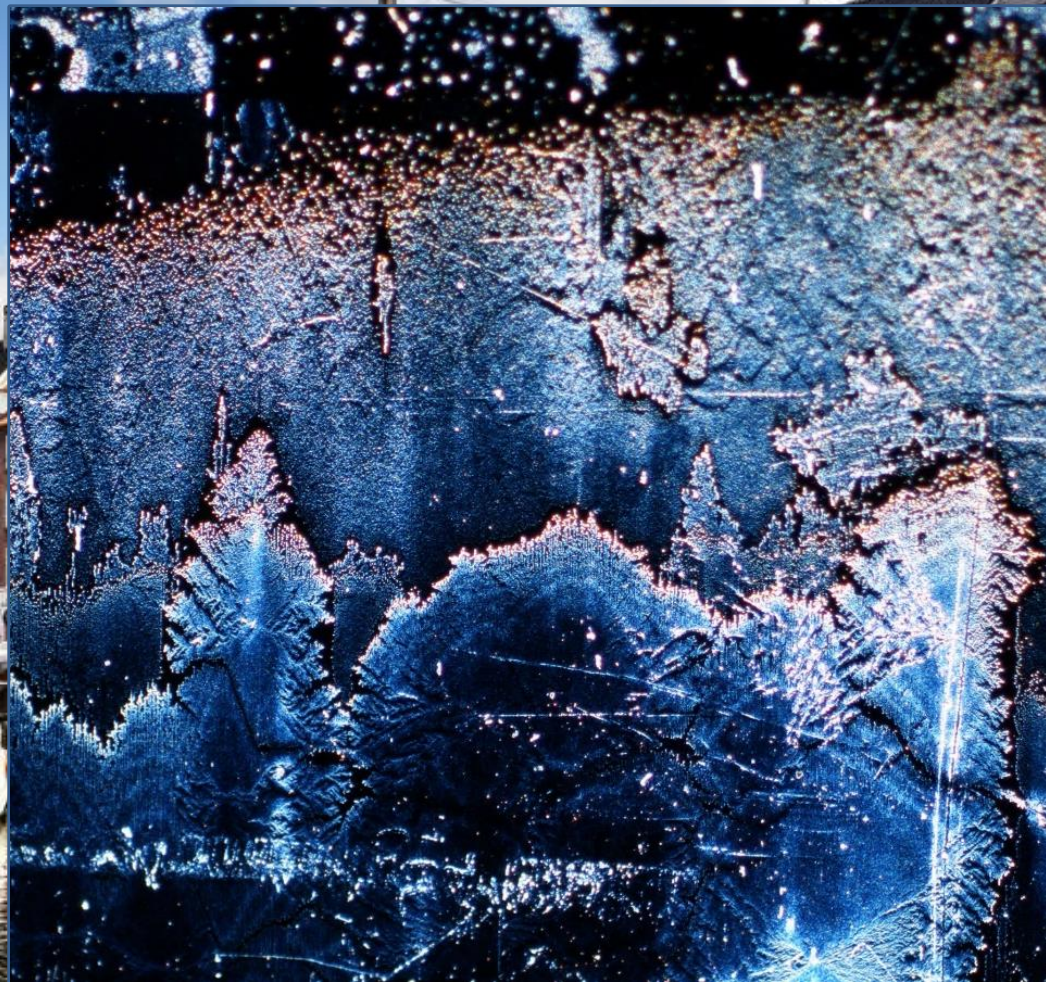
Darkfield microscope image
w/o colouring

Submitted by: Marco Lindner

Affiliation: Stratec Consumables GmbH

Instrument: Darkfield microscope

Magnification: 10x



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Wheel tracks in a nano-winter

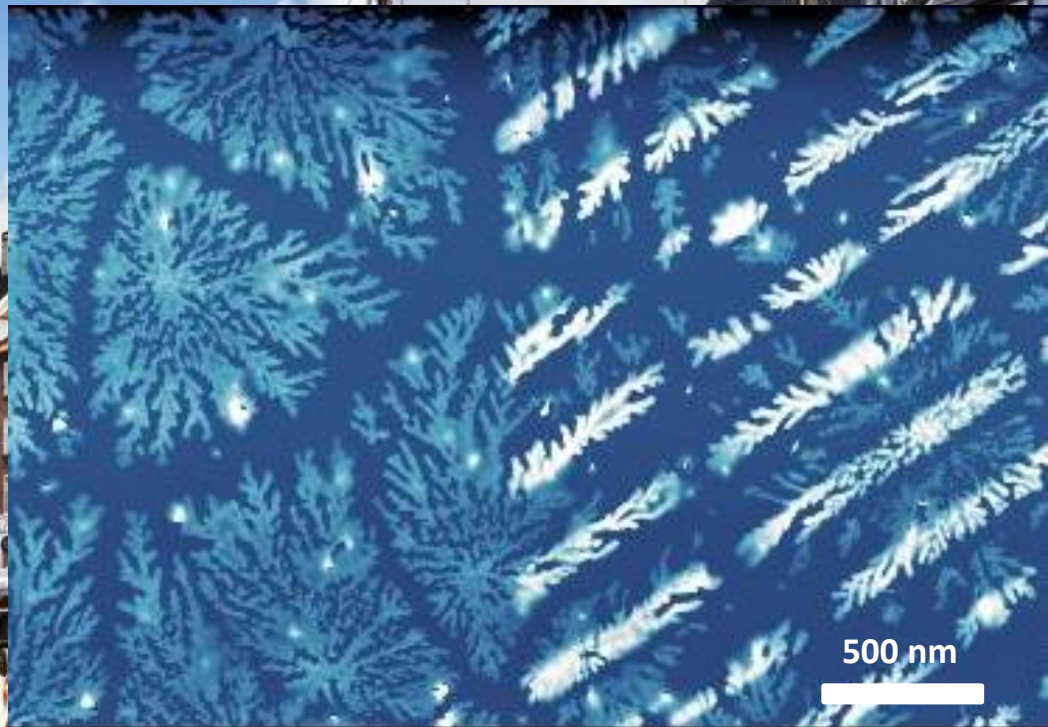
AFM-image of a nanocontact print of crystallized proteins and salts. Should be a homogeneous protein layer.
Maximum height: 150 nm

Submitted by: Marco Lindner

Affiliation: Stratec Consumables GmbH

Instrument: Atomic Force Microscopy

Magnification: -



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Dawning of intelligence leaves blank spots. Or: Why are you still watching? I am leaving.

AFM image of scratched nanopillars of acryloyl morpholine.

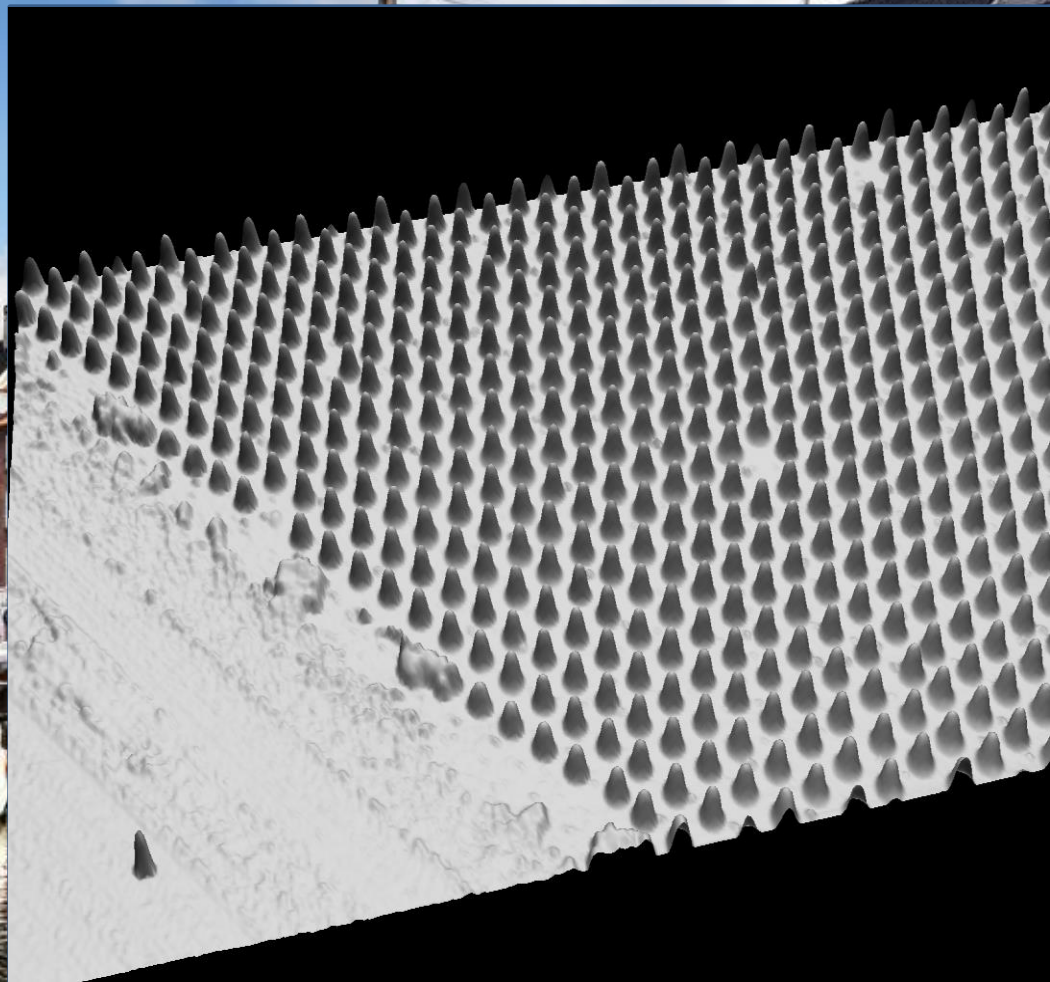
Pillar diameter $\sim 200\text{nm}$,
height $\sim 100\text{nm}$

Submitted by: Marco Lindner

Affiliation: Stratec Consumables GmbH

Instrument: Atomic Force Microscopy

Magnification: -



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Honorable Mention

Title: Tulips in love

Description:

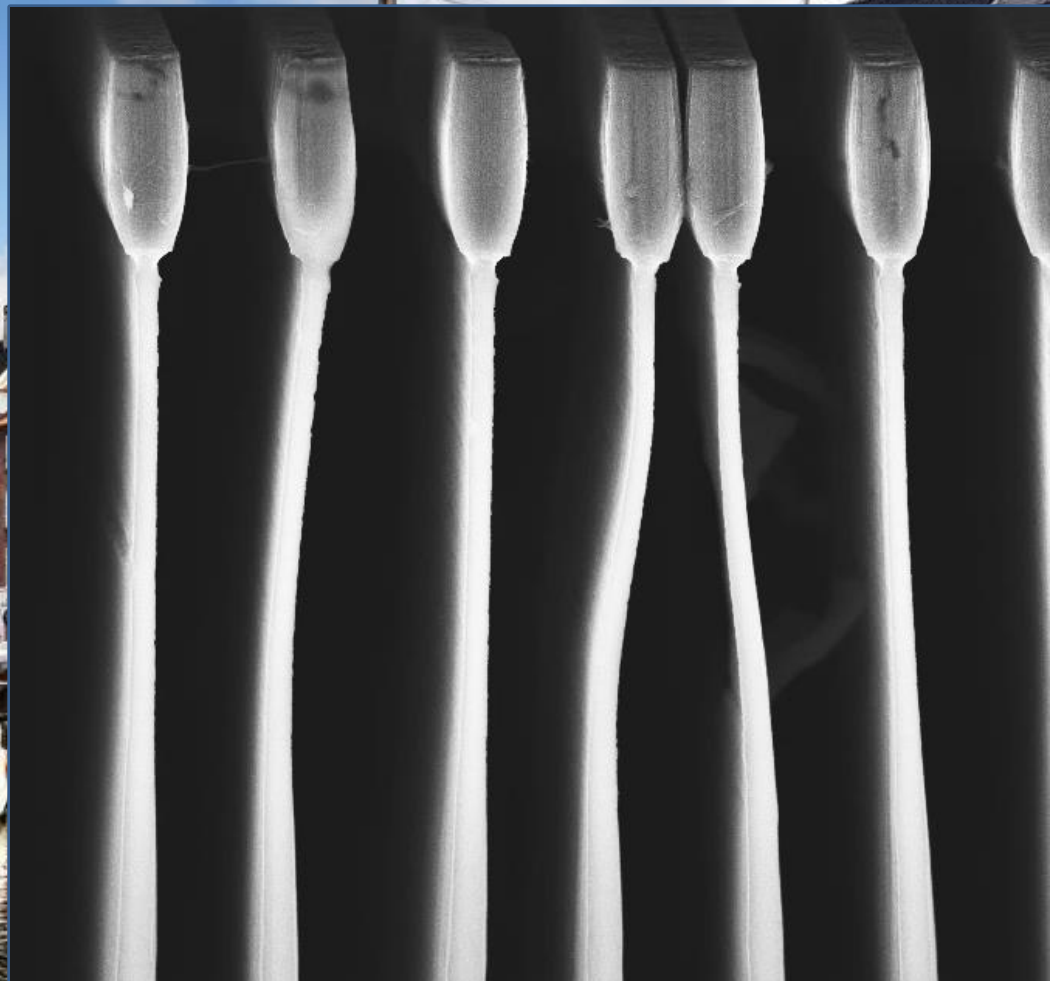
SEM of silicon grating. A crazy metal assisted chemical etching formed some tulips that eventually fall in love

Submitted by: Lucia Romano

Affiliation: PSI

Instrument: SEM Zeiss Supra VP55

Magnification: 8000 X



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Title: Ceramic sunflowers

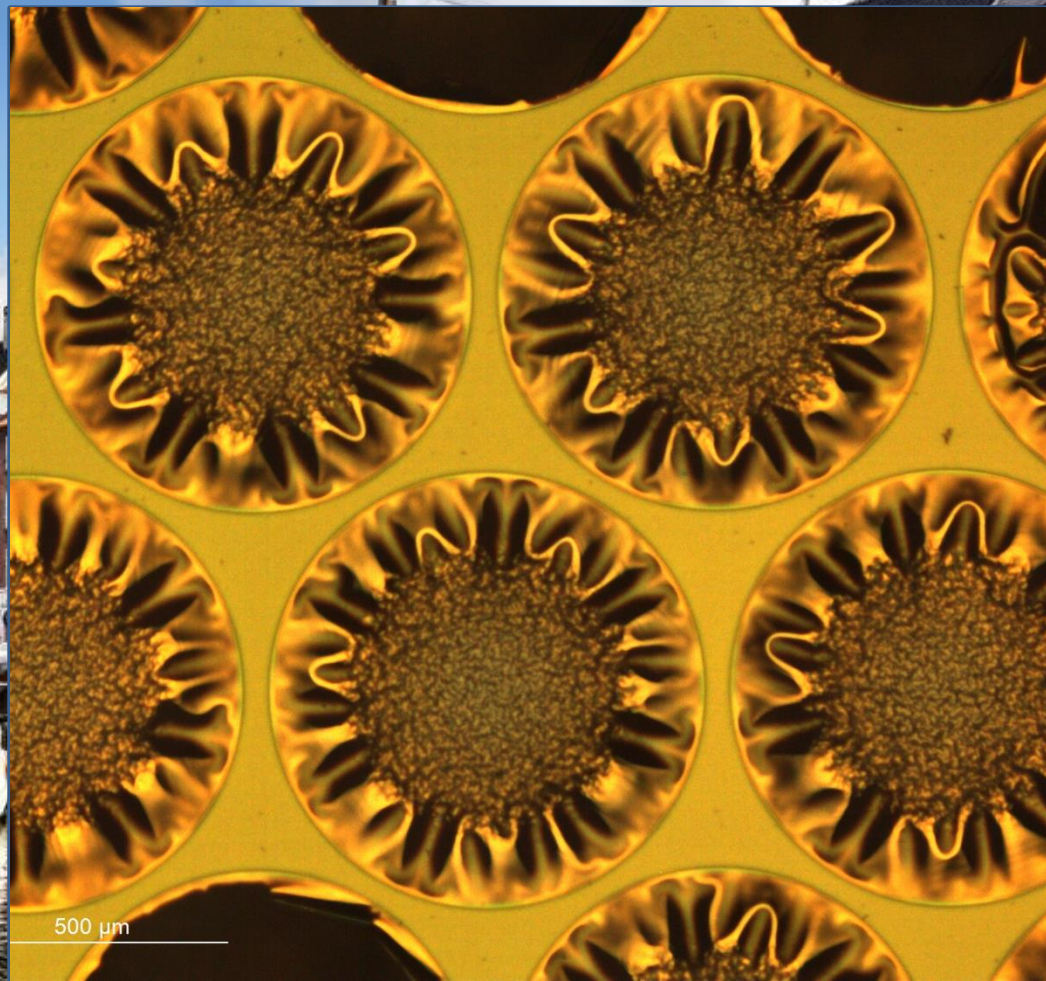
Description: Partially released yttria-stabilized zirconia membranes supported on doped silicon slabs. Here, the center of the flowers remained attached to the Si_3N_4 layer underneath.

Submitted by: Nerea Alayo

Affiliation: IREC

Instrument: Zeiss Axio Imager

Magnification: 10 x



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Title: We are tired of standing, it's time to rest!

Description:

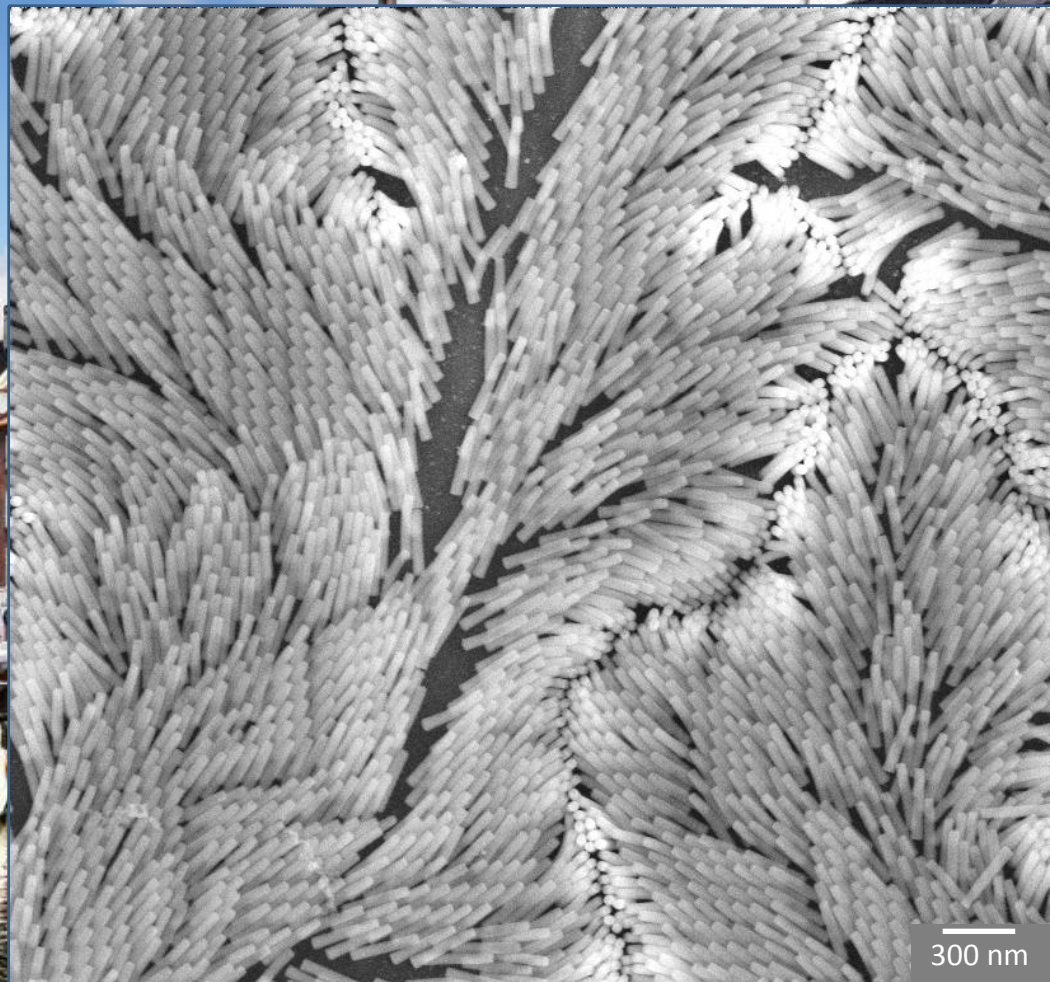
The art of poor adhesion. Pillars of HSQ resist collapsed forming this decorative pattern.

Submitted by: Gediminas Seniutinas

Affiliation: Paul Scherrer Institute

Instrument: Zeiss Supra 55 VP

Magnification: 60200 x



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Title: The question of life: which direction to go?

Description: 1st Place

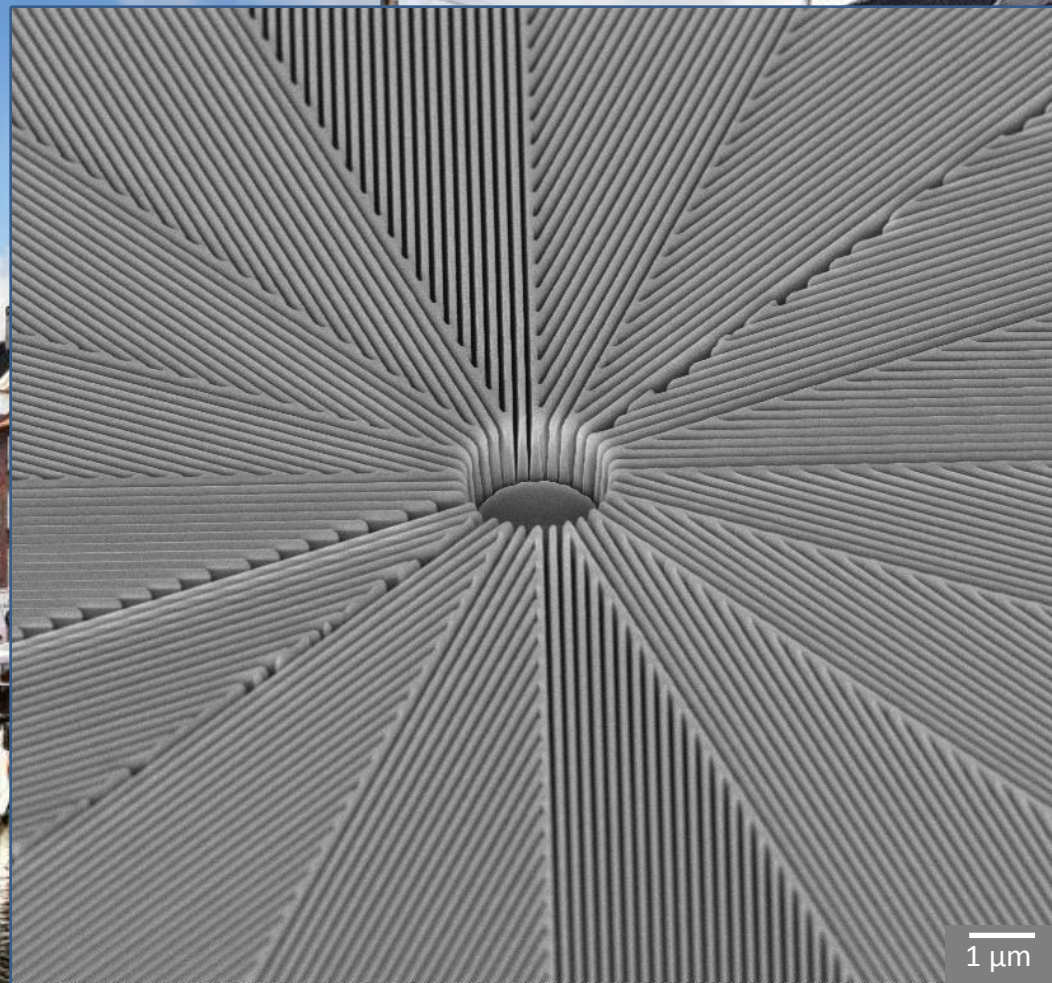
Sub-wavelength diamond nanostructure to control the light field at the microscale.

Submitted by: Gediminas Seniutinas

Affiliation: Paul Scherrer Institute

Instrument: Zeiss Supra 55 VP

Magnification: 19000 x



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Title: Fullerene on steroids

Description:

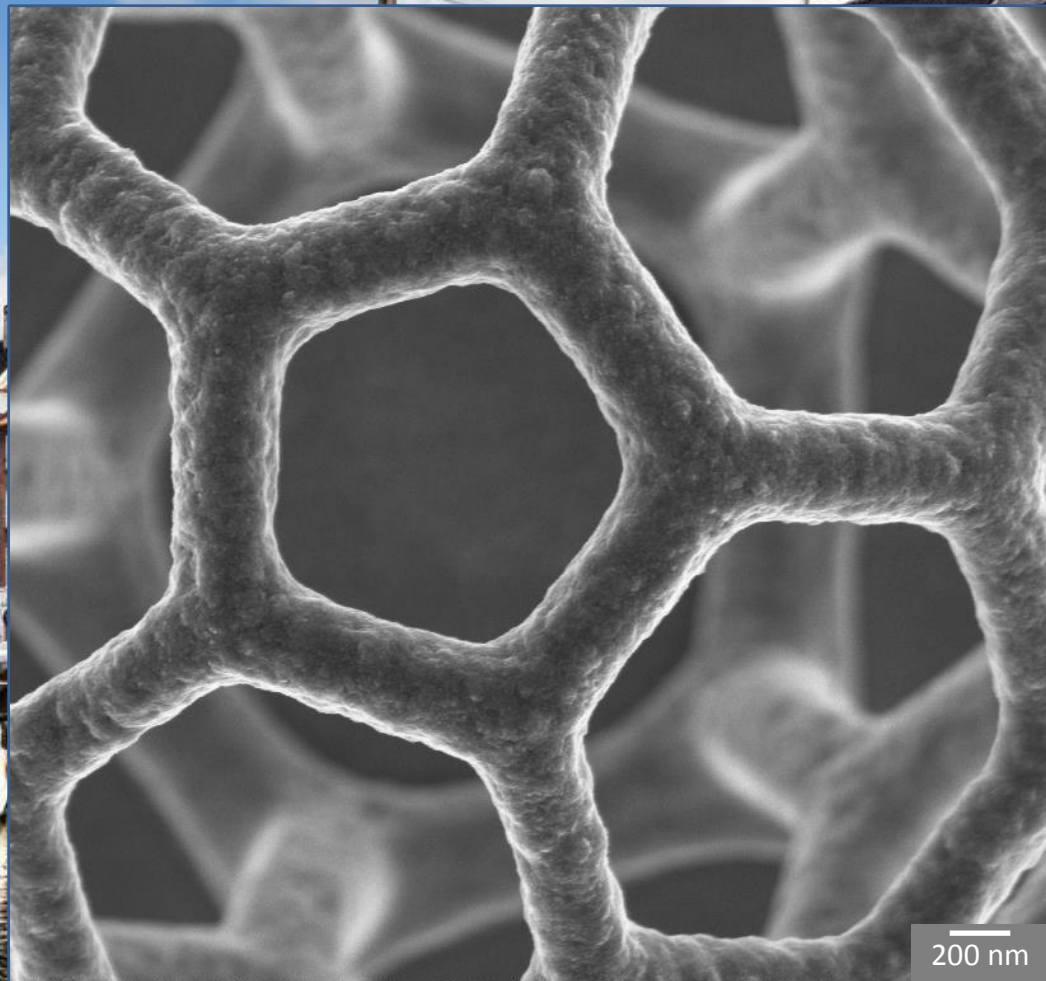
A fragment of magnetic buckyball made by post processing 3D laser polymerized scaffold.

Submitted by: Gediminas Seniutinas

Affiliation: Paul Scherrer Institute

Instrument: Zeiss Supra 55 VP

Magnification: 90000 x



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200 nm

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Title: Marine nanosponges

Description:

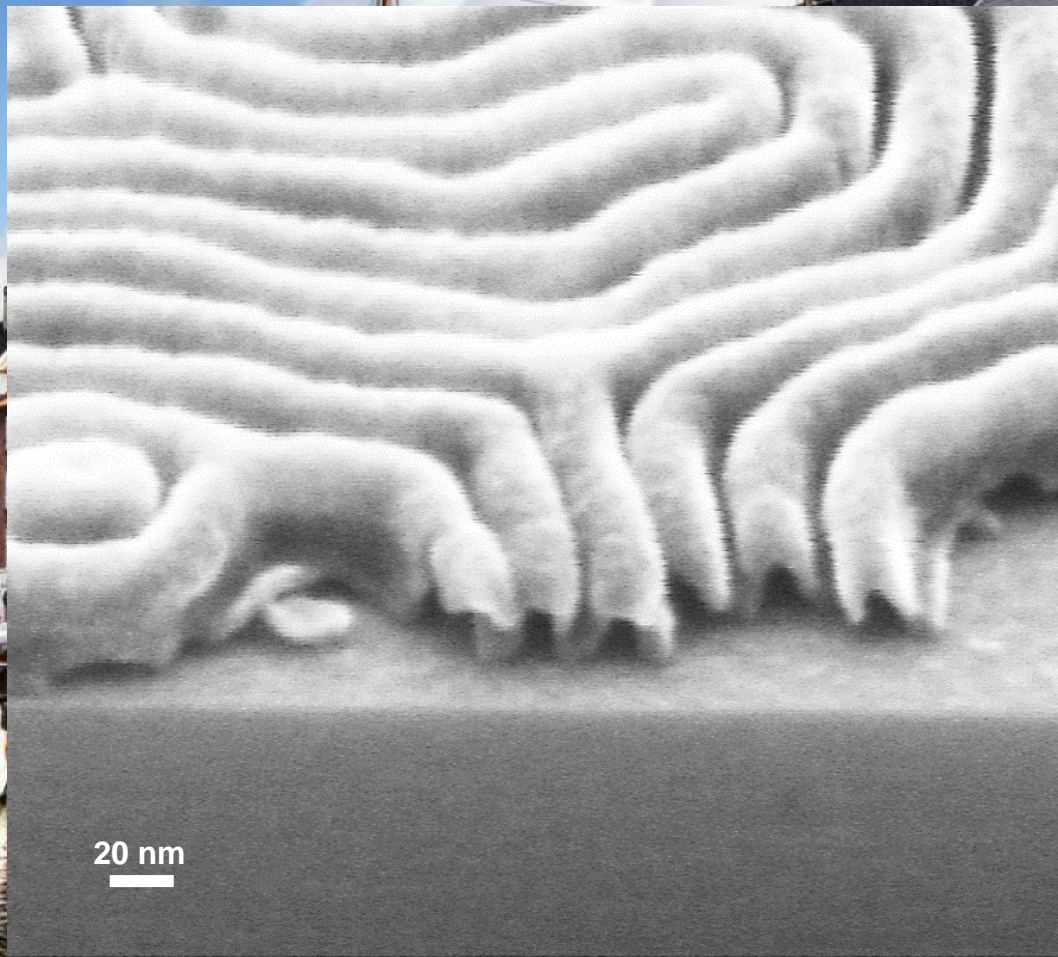
These TiN nanochannels were fabricated on silicon with the help of directed self-assembly of block copolymers.

Submitted by: Christian Pinto-Gómez

Affiliation: IMB-CNM, CSIC

Instrument: Carl Zeiss Auriga-40 SEM

Magnification: 600K X



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Title: Wonderland's Nanolabyrinth

Description:

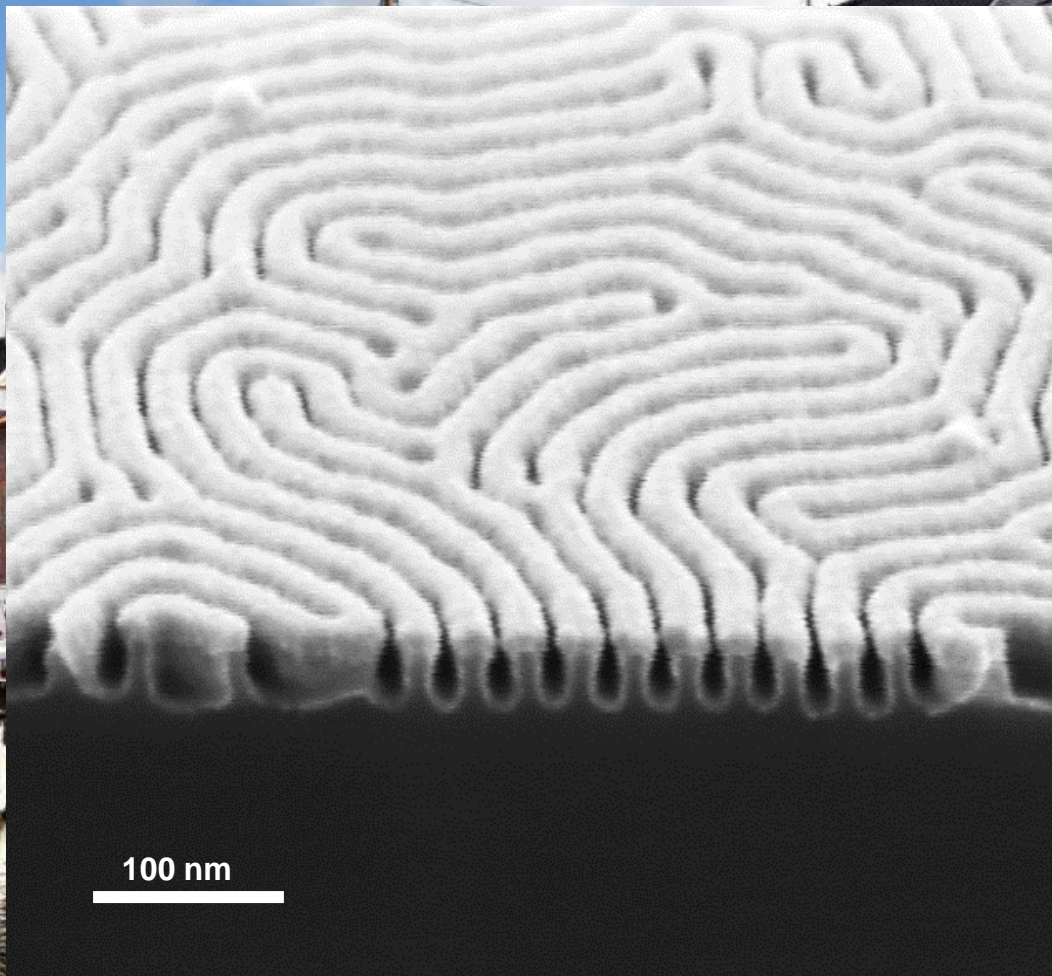
These 12x35 nm fins are the result of the pattern transfer onto silicon of a polystyrene mask and its further metallization.

Submitted by: Christian Pinto-Gómez

Affiliation: IMB-CNM, CSIC

Instrument: Carl Zeiss Auriga-40 SEM

Magnification: 300K X



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Honorable Mention

Title: Perfectionist's nightmare

Description:

Highly ordered Al-doped ZnO tube structures fabricated by deep UV lithography, ALD and deep reactive ion etching. The thickness of tube walls can be as thin as 20 nm!

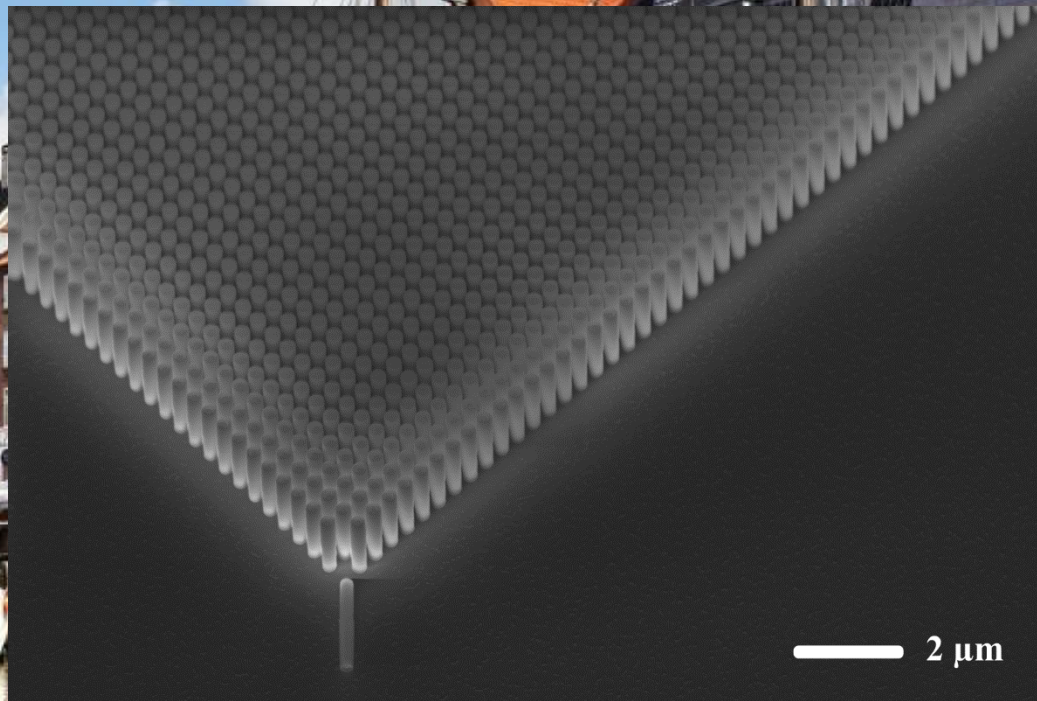
Submitted by: Evgeniy Shkondin

Affiliation: DTU-Fotonik

Technical University of Denmark (DTU)

Instrument: SEM Zeiss Supra 60VP

Magnification: 15.72 k X



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----- Contest -----

Honorable Mention

Title: I made it! I will be a girl!

Description:

TiO₂ nanoparticles on a wafer after RIE process.

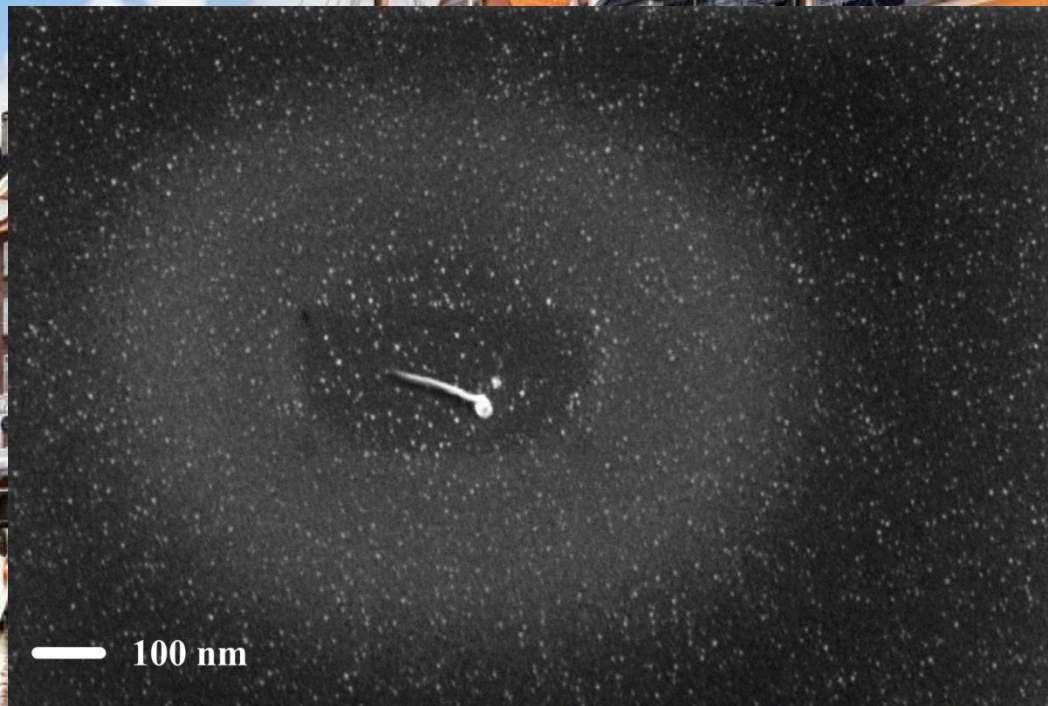
Submitted by: Evgeniy Shkondin

Affiliation: DTU-Fotonik

Technical University of Denmark (DTU)

Instrument: SEM Zeiss Supra 60VP

Magnification: 207.15 kX



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----- Contest -----

Title: A drop of water in a lake.

Description:

FIB produced multicircular pattern in TiN/Al₂O₃
high aspect ratio gratings.

Submitted by: Evgeniy Shkondin

Affiliation: DTU-Fotonik

Technical University of Denmark (DTU)

Instrument: SEM Zeiss Supra 60VP

Magnification: 4.14 k X



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What's under the rug?

2nd Place

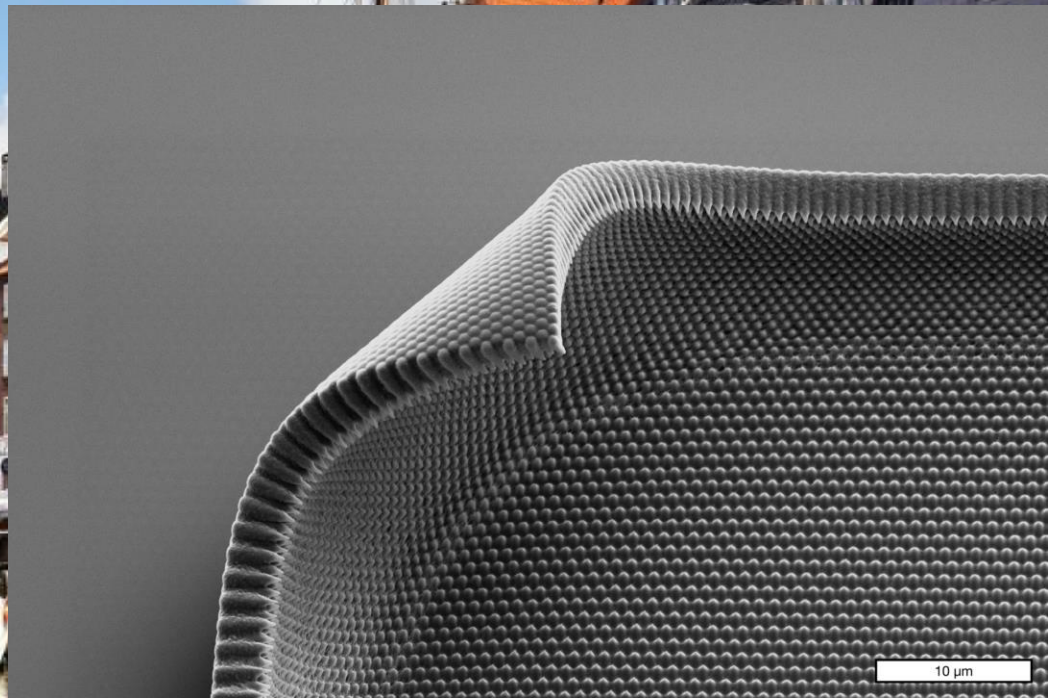
EBL exposure with too high dose can result in carpets of nanopillars instead of free standing pillars. When the carpet delaminates it is possible to see all sides of the pillars.

Submitted by: Jakob Vinje

Affiliation: Norwegian University of
Science and Technology (NTNU)

Instrument: FEI Apreo SEM

Magnification: 2000x



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Small and less small pillars

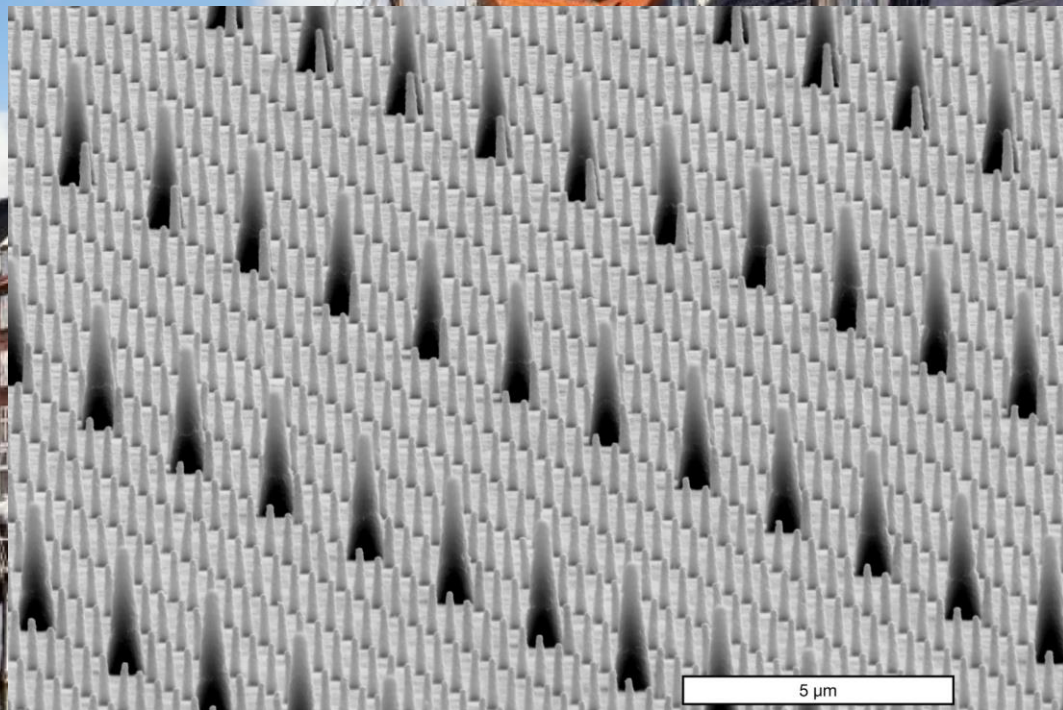
Taking electron micrographs at an angle makes one observe features at the nanoscale not easily seen when imaging at normal incidence. Seeing things from another angle can often be useful.

Submitted by: Jakob Vinje

Affiliation: Norwegian University of
Science and Technology (NTNU)

Instrument: FEI Apreo SEM

Magnification: 6500x



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Honorable Mention

Title: The Ghost of MNE!

Description:

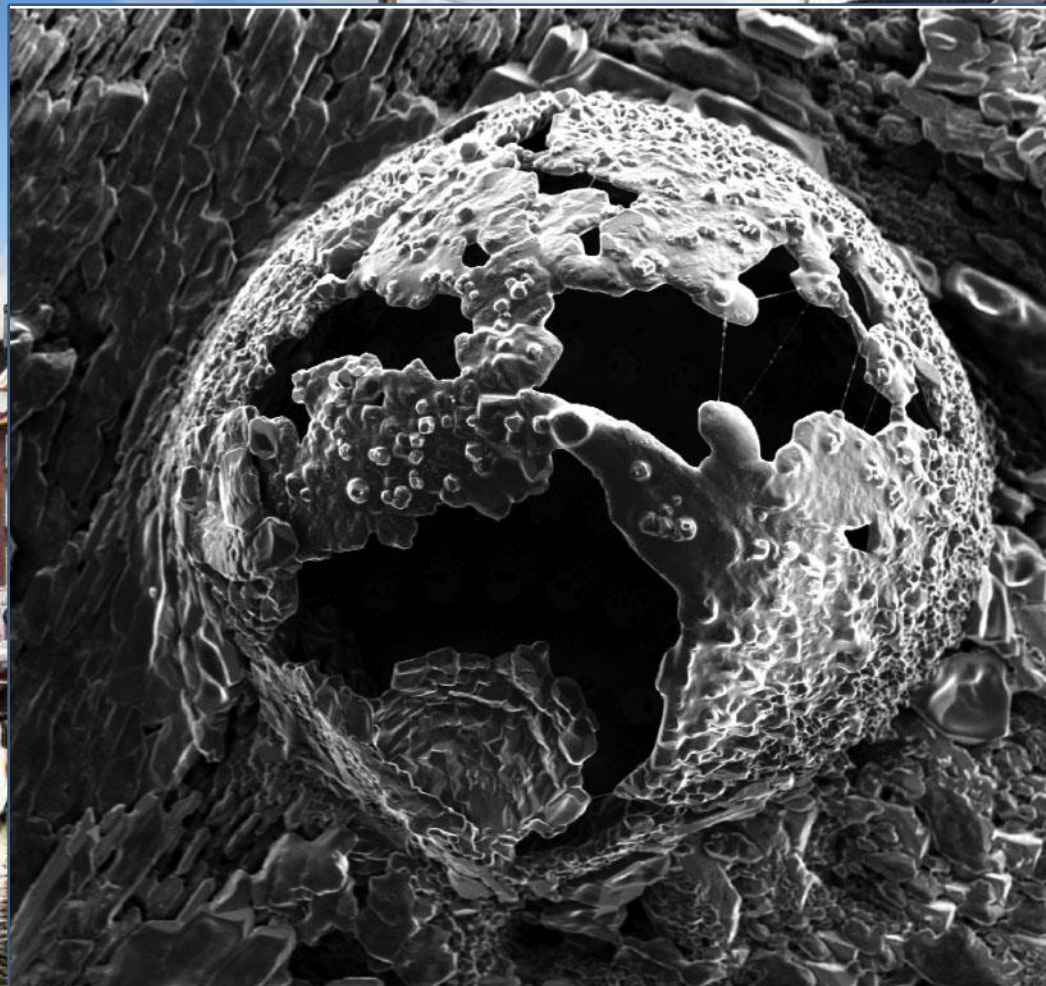
Salt and DNA dehydrated residuals suspended and concentrated over a superhydrophobic device.

Submitted by: Monica Marini

Affiliation: KAUST

Instrument: Quanta 200, FEI

Magnification: 1000x



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Title: Salty Butterfly

Description:

Salt residual of a sodium-based buffer is concentrated in a limited area of a superhydrophobic device.

Submitted by: Monica Marini

Affiliation: KAUST

Instrument: Quanta 200, FEI

Magnification: 1037x



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Title: Structured Chaos

Description:

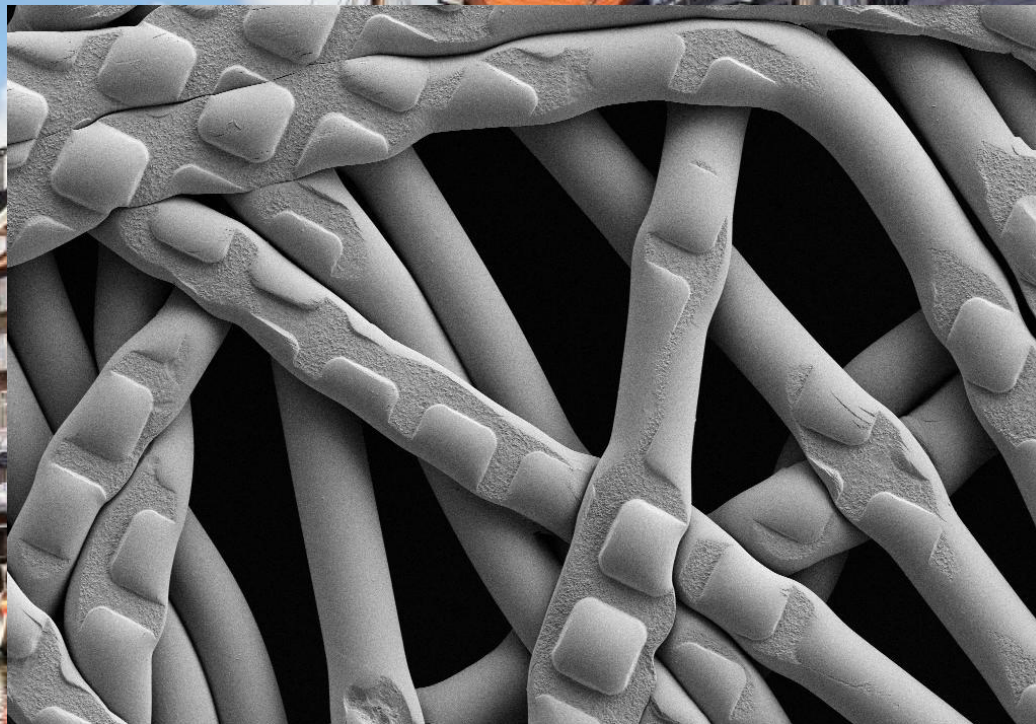
SEM image of micro-structured polymer fibers. Structured using R2R replication technique. Fibers embedded in nonwoven context.

Submitted by: Andreas Striegel

Affiliation: KIT – Institute of Microstructure Technology

Instrument: Zeiss SUPRA 60VP

Magnification: 500 X



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Title: Morning light in the Micro Jungle

Description:

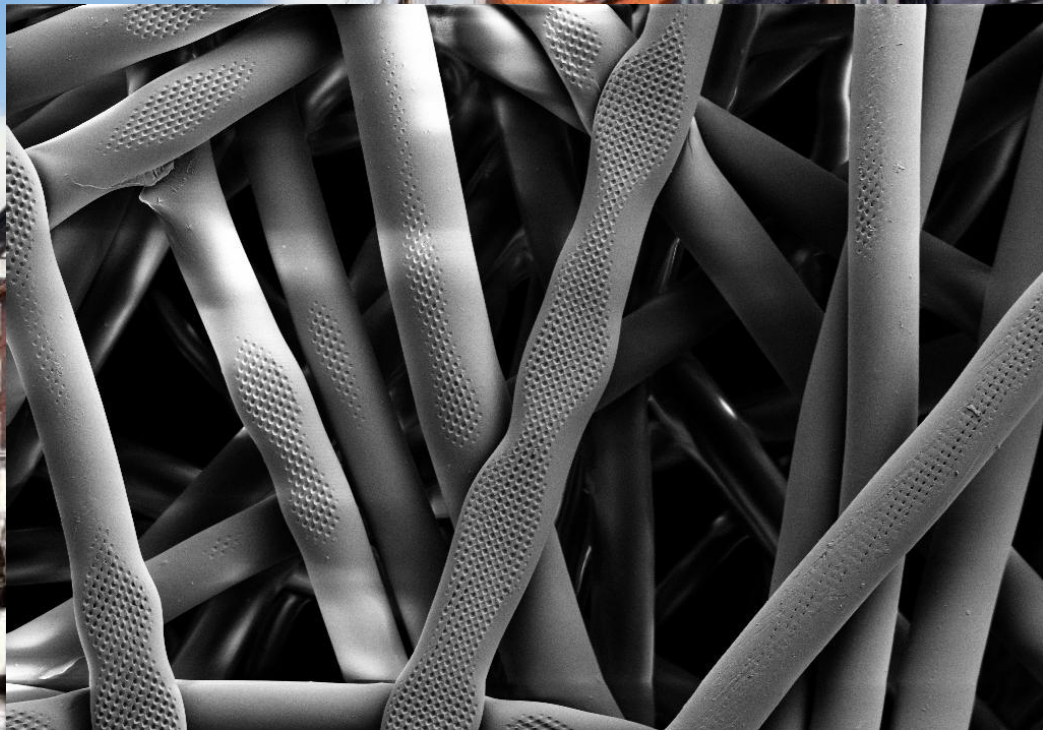
SEM image of micro-structured polymer fibers. Structured using R2R replication technique. Fibers embedded in nonwoven context.

Submitted by: Andreas Striegel

Affiliation: KIT – Institute of Microstructure Technology

Instrument: Zeiss SUPRA 60VP

Magnification: 500 X



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Honorable Mention

Title: After this great summer,
Winter is coming!

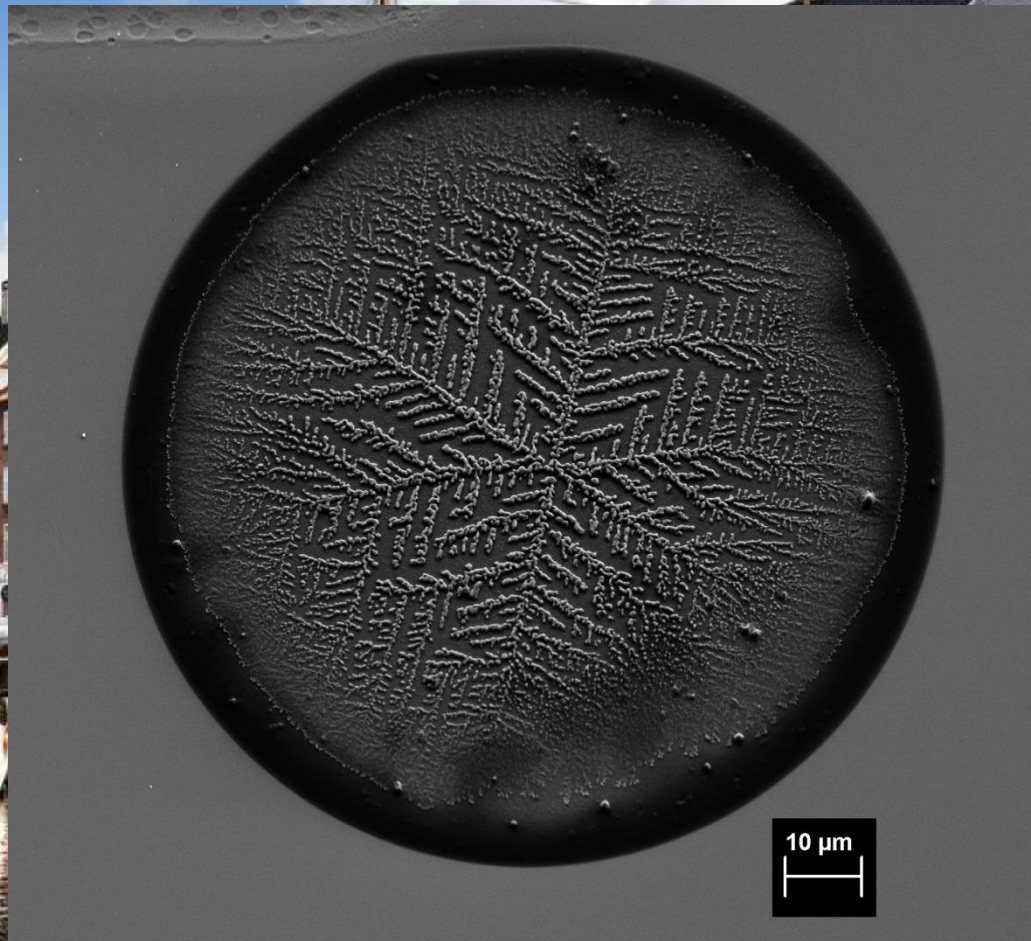
Description: SEM of a laser-modified
chromium layer on fused silica

Submitted by: Joachim Zajadacz

Affiliation: Leibniz Institute of Surface Engineering

Instrument: Carl Zeiss Ultra 55

Magnification: 1k

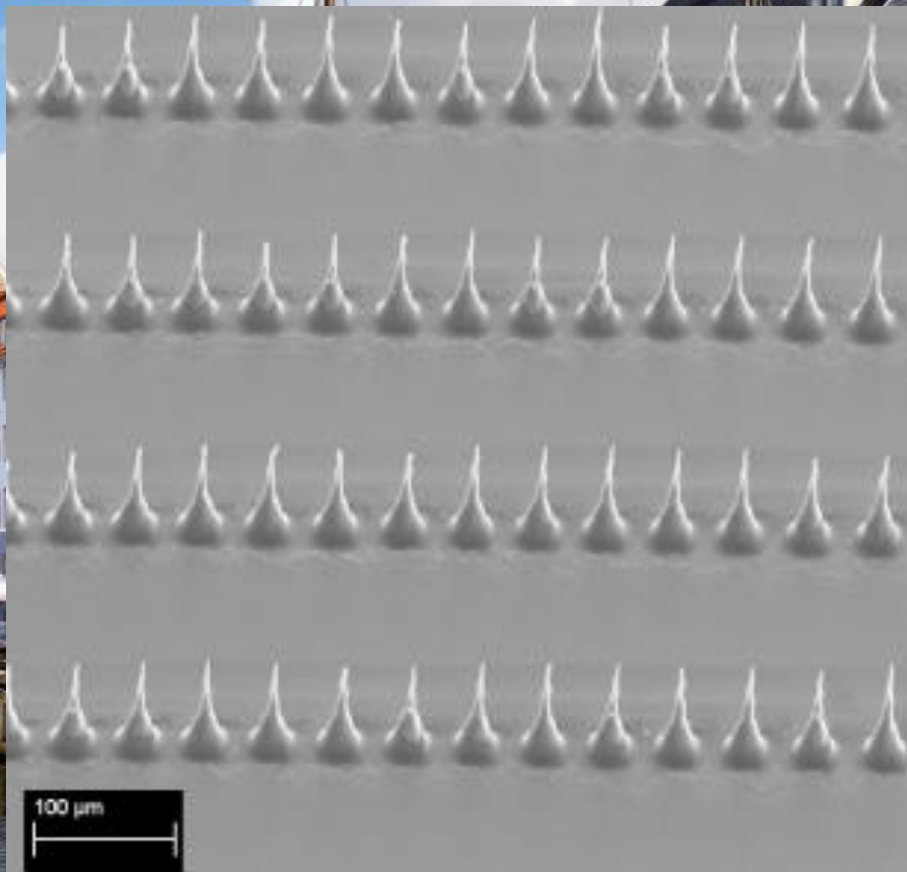


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Title: Christmas Candles

Description: SEM of a silicone molding.
Molded from a laser-modified nickel master.



Submitted by: Joachim Zajadacz

Affiliation: Leibniz Institute of Surface Engineering

Instrument: Carl Zeiss Ultra 55

Magnification: 250



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Title: Nanoplanes ready for take-off!

Description:

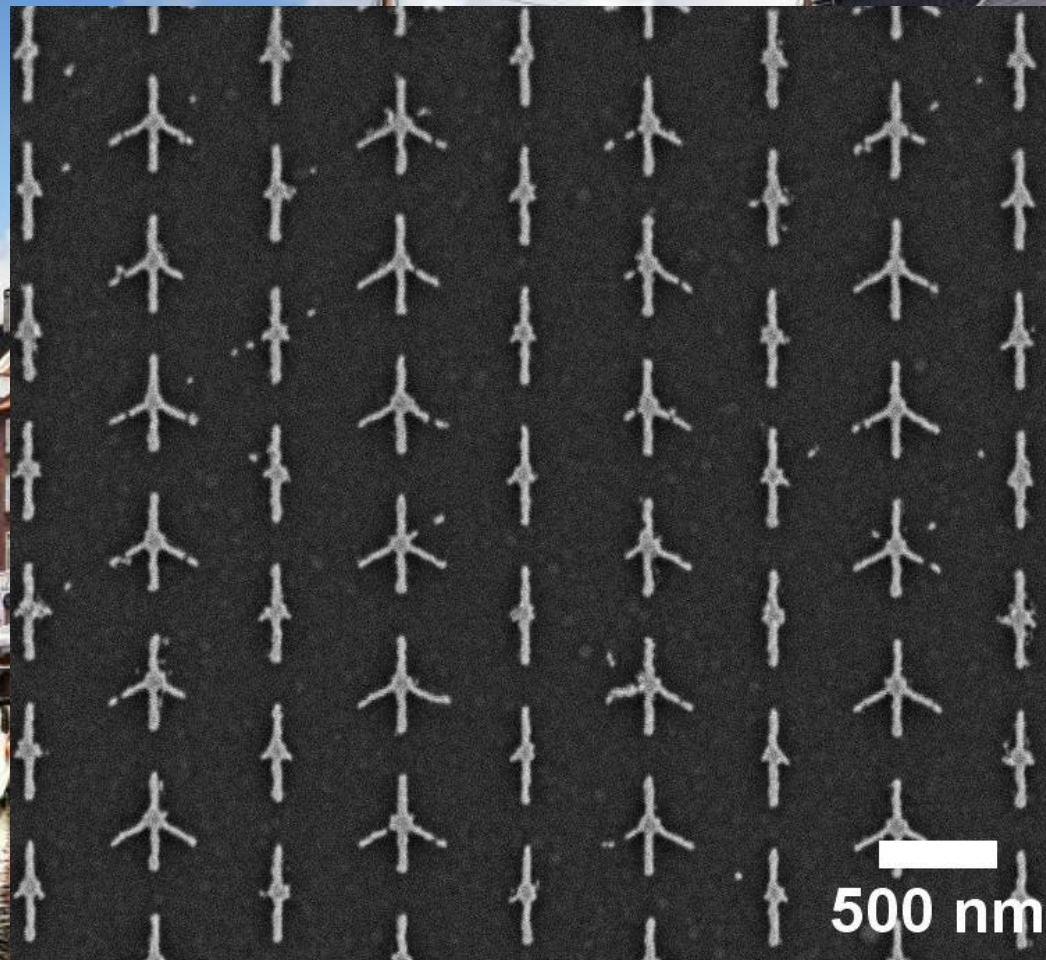
These Au nanoplanes, obtained by EBL, should have been nanostars but the dose was not enough to obtain the desired patterns.

Submitted by: Ana Conde-Rubio

Affiliation: University of Barcelona

Instrument: Carl Zeiss, Auriga-40, SEM

Magnification: 50k X



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----- Contest -----

Title: Feeling blue? These nano-chocolates might help.

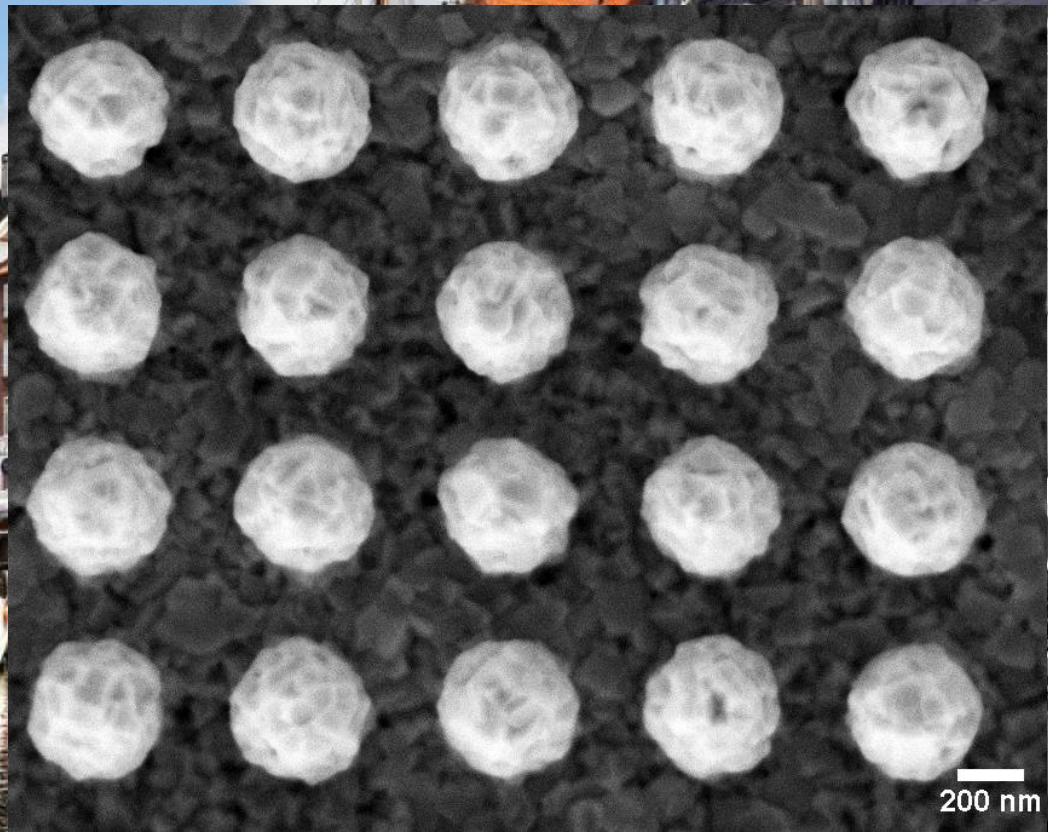
Description:
Golden nanobumps fabricated by soft lithography.

Submitted by: Ana Conde-Rubio

Affiliation: University of Barcelona

Instrument: Carl Zeiss, Auriga-40, SEM

Magnification: 80.83k X



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Title: Which insect are these cocoons hiding?

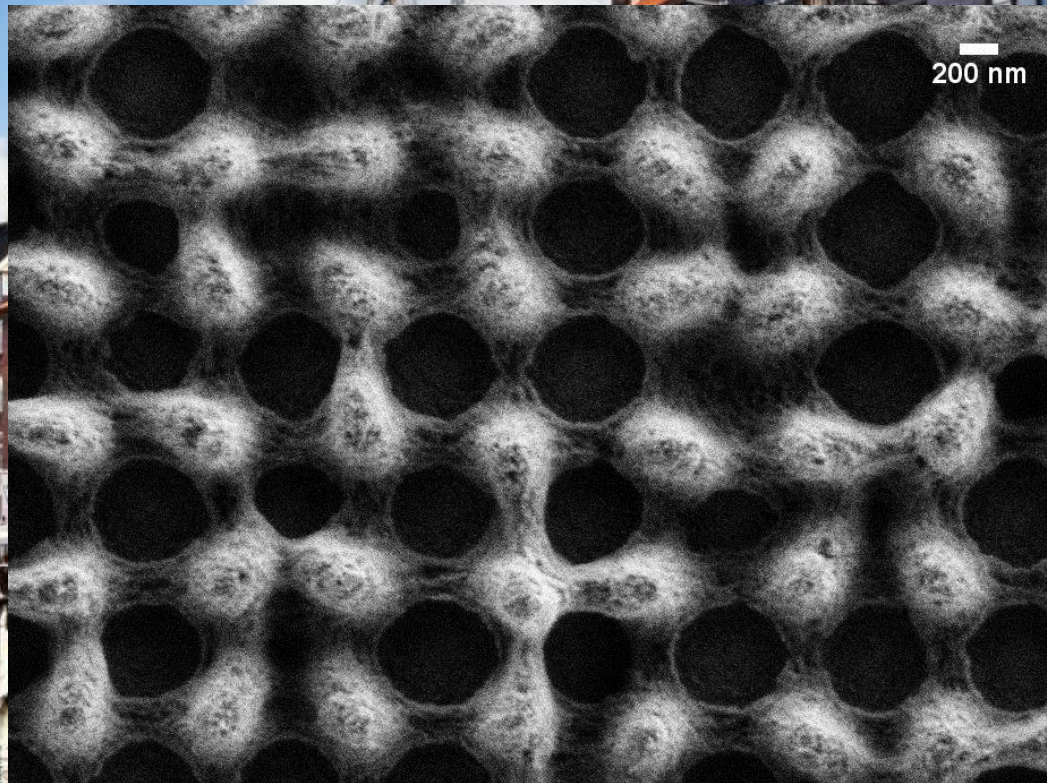
Description: These patterns obtained by photolithography should have become Si cylinders.

Submitted by: Ana Conde-Rubio

Affiliation: University of Barcelona

Instrument: FE-SEM LEO 1530

Magnification: 50k X



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----- Contest -----

Honorable Mention

Title: Nordic Design goes Nano

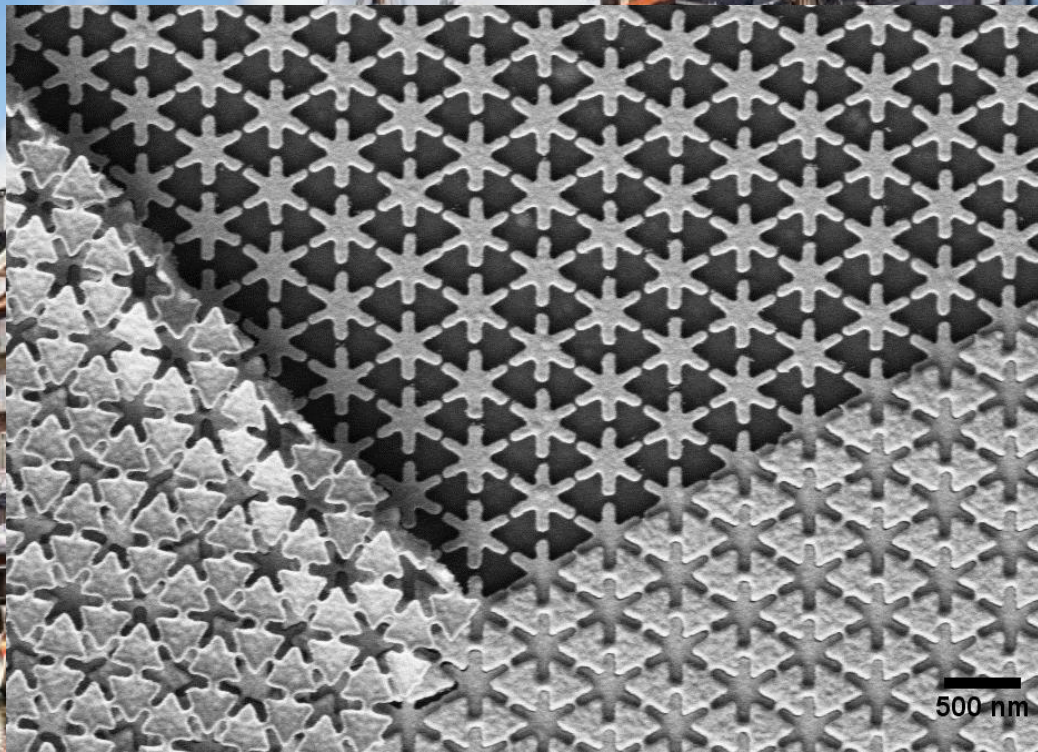
Description: Hexagonal lattice of Au nanoasterisks during lift-off

Submitted by: Ana Conde-Rubio

Affiliation: University of Barcelona

Instrument: FE-SEM LEO 1530

Magnification: 50k X



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----- Contest -----

Title: "The sun will rise, and we will try again" – MNE Peoples Choice

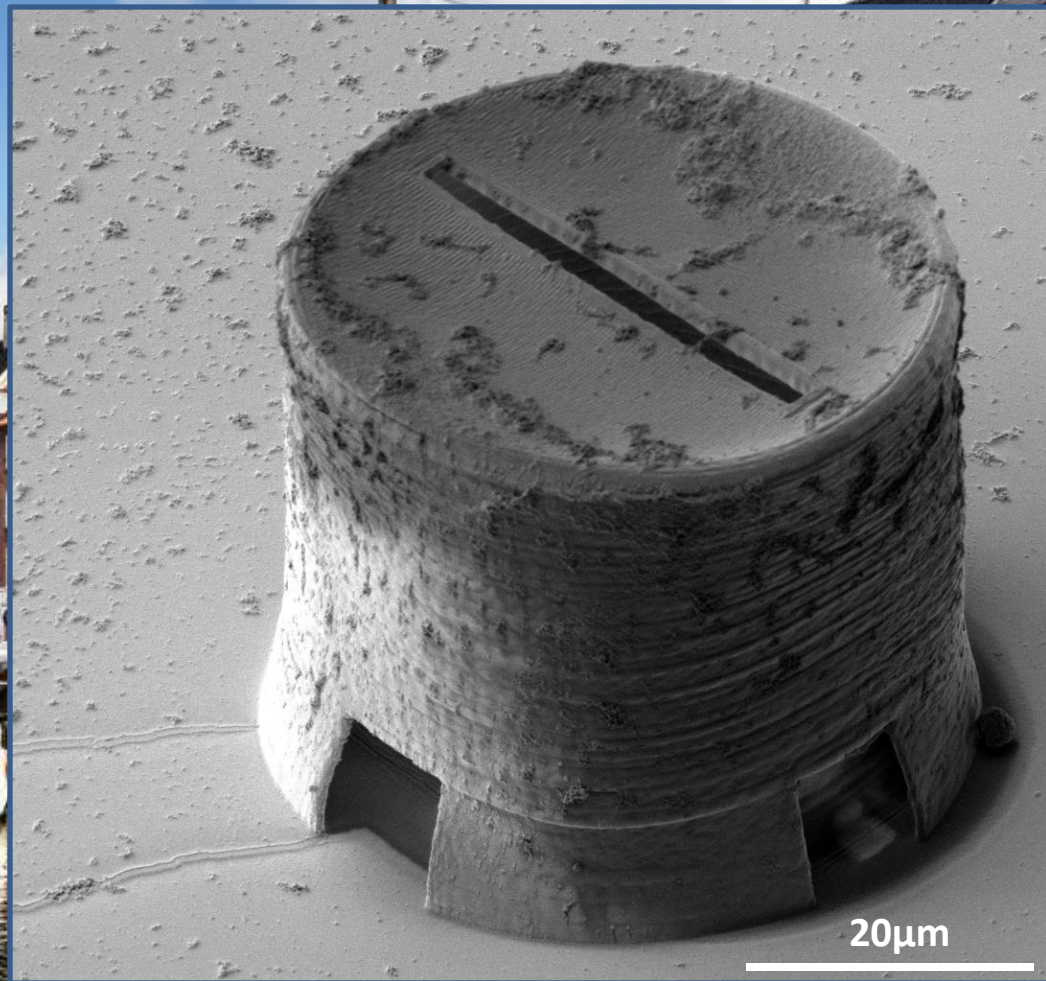
Description: SEM image of a sacrificial stencil mask for on polymer metal evaporation. The structure was fabricated using 2 Photon Lithography on two different resist layers.

Submitted by: Salvatore Puce

Affiliation: Università del Salento - iit

Instrument: SEM HeliosNanoLab600i

Magnification: 4 kX



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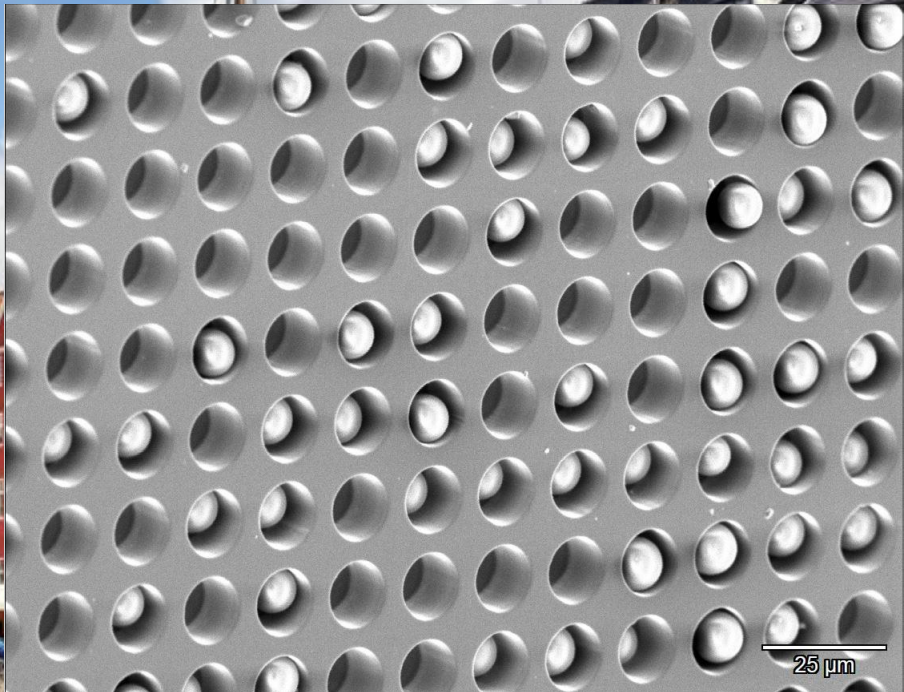
----- Contest -----

Title: A Game of Go

3rd Place

Description:

Trapping device used to isolate individual silica microspheres from agglomerates.



Submitted by: Nathaniel Berneman & Ignaas Jimidar

Affiliation: University of Twente & Vrije Universiteit Brussel

Instrument: JEOL JSM-6400 (SEM)

Magnification: 600



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----- Contest -----

Title: The microplanet...

Description:

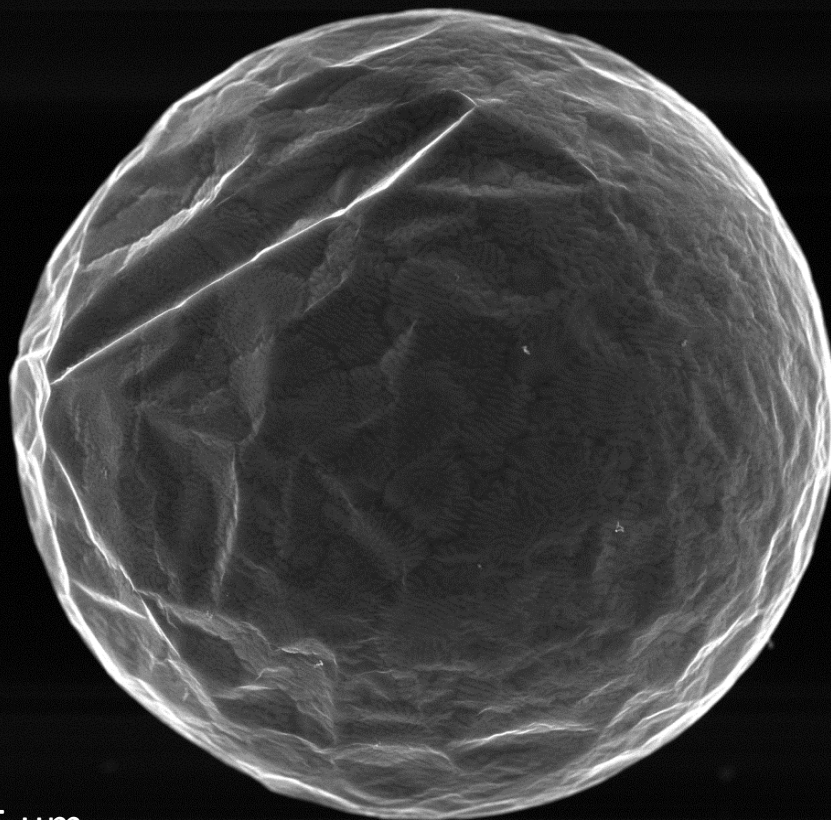
The microplanet is a indeed a microparticle of unknown origin that needs to be furthered explored...

Submitted by: Dimitrios Kazazis

Affiliation: Paul Scherrer Institute

Instrument: Hitachi Regulus s8230

Magnification: 2.2k



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----- Contest -----

Title: The nano-Code of Hammurabi

Description:

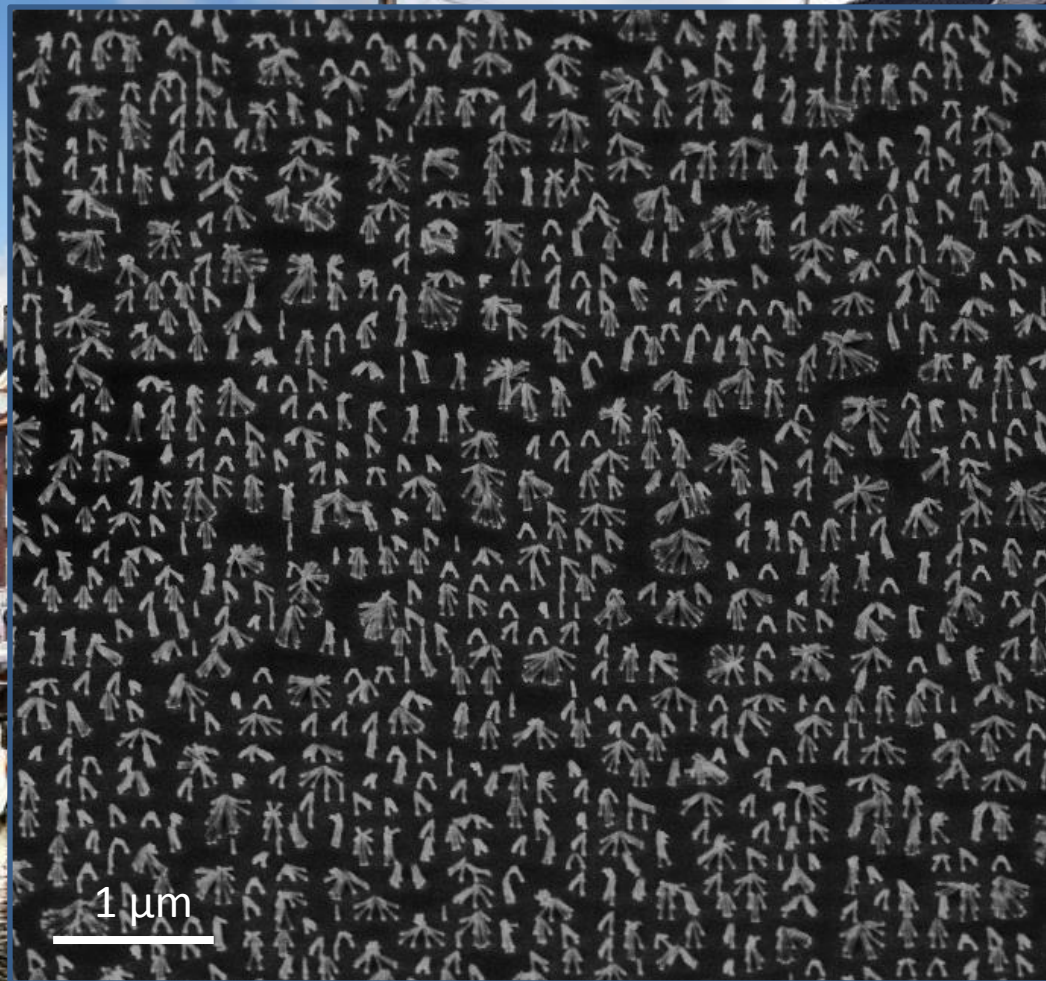
36 nm diameter HSQ pillars patterned by EBL, collapsed and merged after development and drying

Submitted by: Dimitrios Kazazis

Affiliation: Paul Scherrer Institute

Instrument: Zeiss Supra 55 VP

Magnification: 36.35k



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Title: 🎵 All the cats join in 🎵

Description:

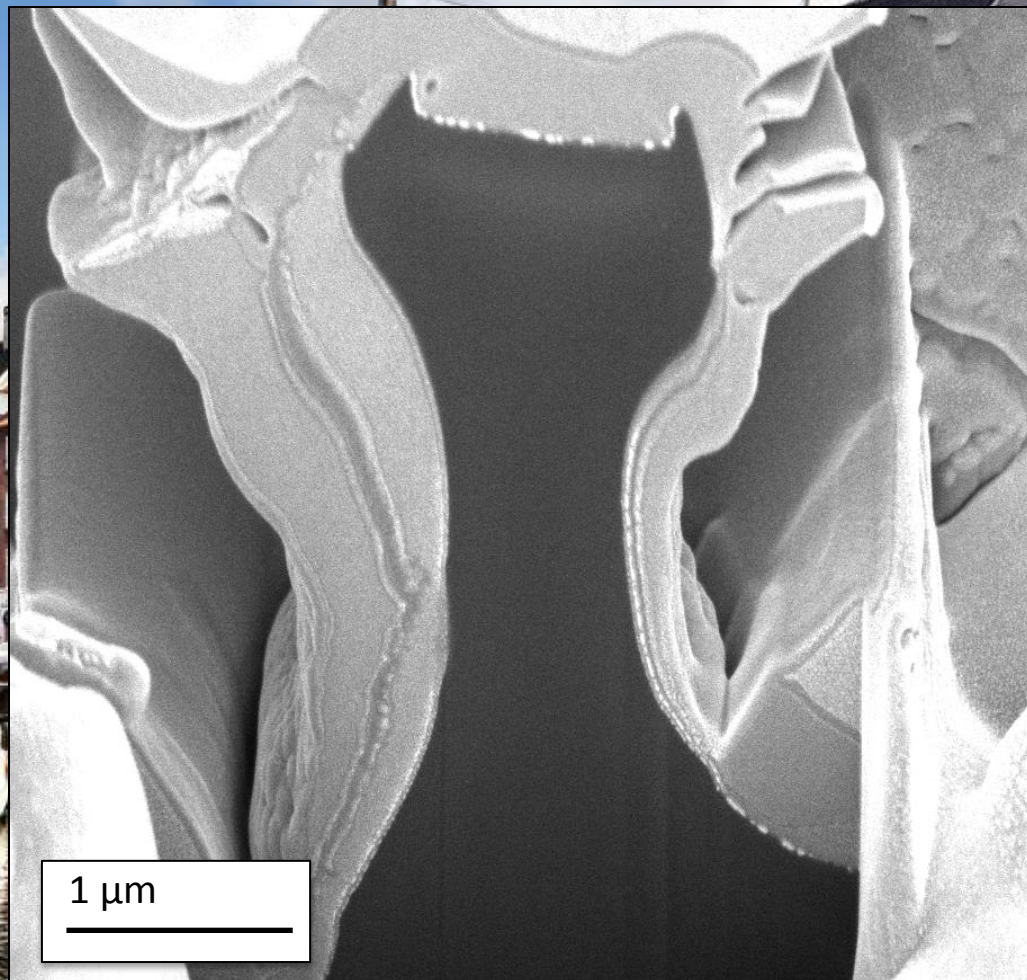
Of course this is a failed experiment, an attempt of replication of an undercut pattern in plastic, the pattern got stuck in the mold and stretched out looking like a cartoon cat.

Submitted by: Nastasia Okulova

Affiliation: Danapak Flexibles A/S

Instrument: FEI Helios EBS3

Magnification: 25.000



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Title: The majestic peacock

Description:

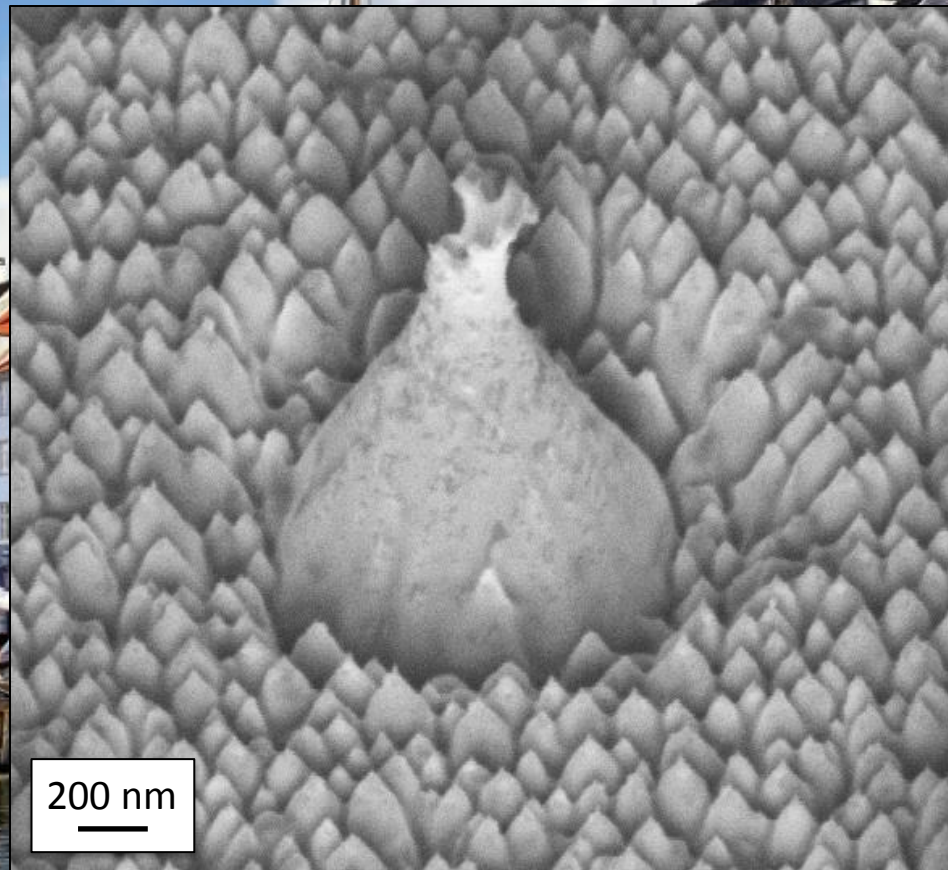
In an attempt to produce superhydrophobic structures, a combination of photolithography and a DRIE process has created this amazing creature

Submitted by: Nastasia Okulova

Affiliation: Danapak Flexibles A/S

Instrument: Supra 40VP SEM

Magnification: 64.300



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----- Contest -----

Title: Crazy dance of the psychedelic mushrooms

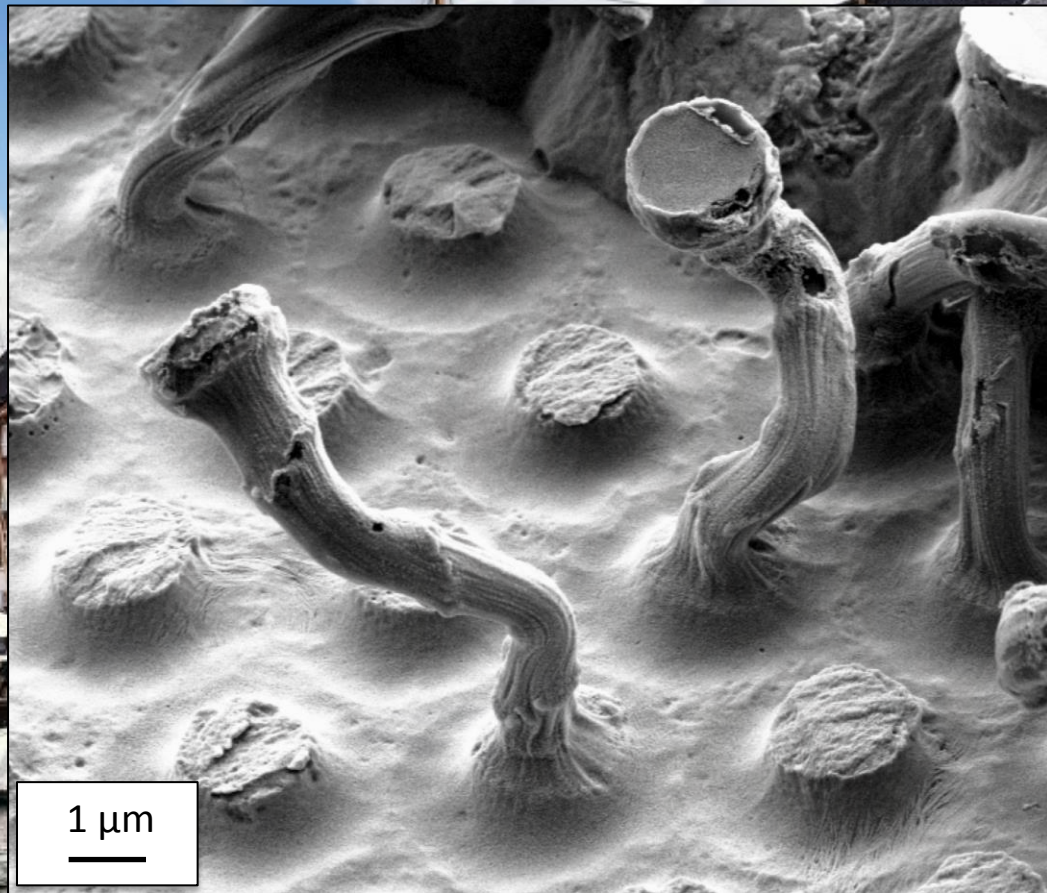
Description: An attempt to replicate an undercut structure in polymer resulted in this pattern. The polymer gets stuck in the mold and stretches out during the mold release.

Submitted by: Nastasia Okulova

Affiliation: Danapak Flexibles A/S

Instrument: Supra 40VP SEM

Magnification: 17.000



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Title: Creature from the bottom of the sea

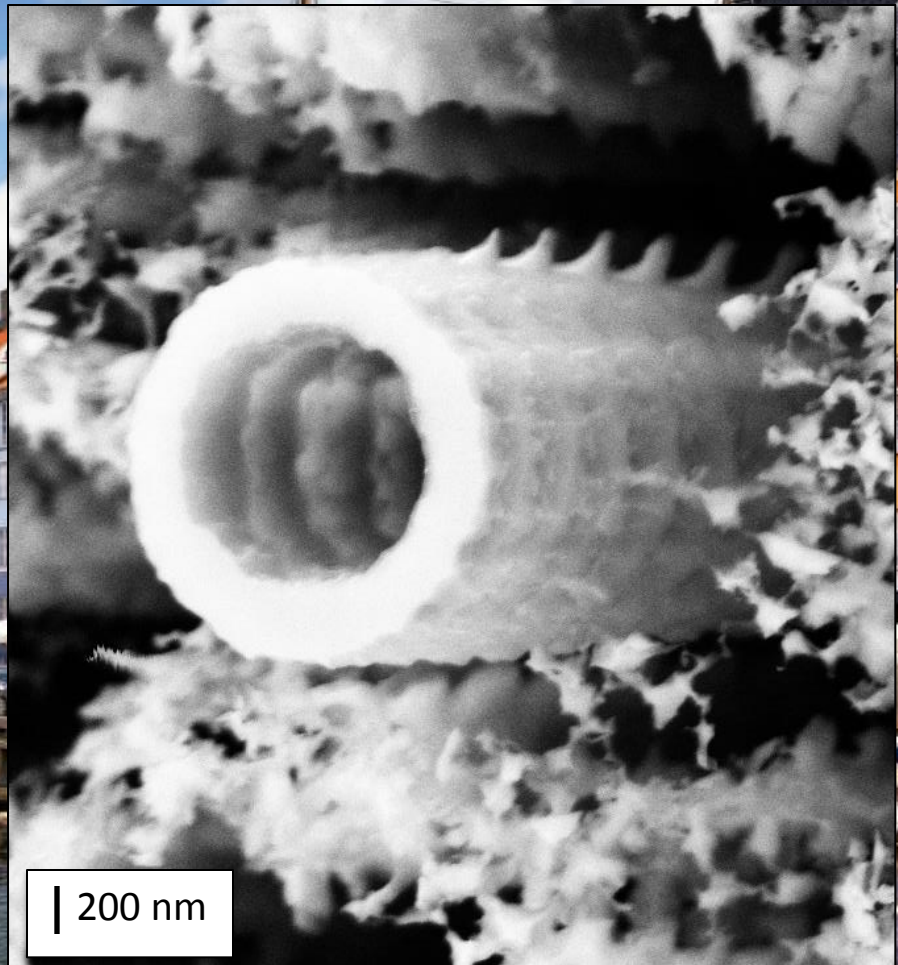
Description: A combination of photolithography and DRIE Bosch process of alternating etching and passivation of a Si wafer created this peculiar pattern (micrograph at 90°)

Submitted by: Nastasia Okulova

Affiliation: Danapak Flexibles A/S

Instrument: Supra 40VP SEM

Magnification: 52.000



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----- Contest -----

Title: Winter wonderland

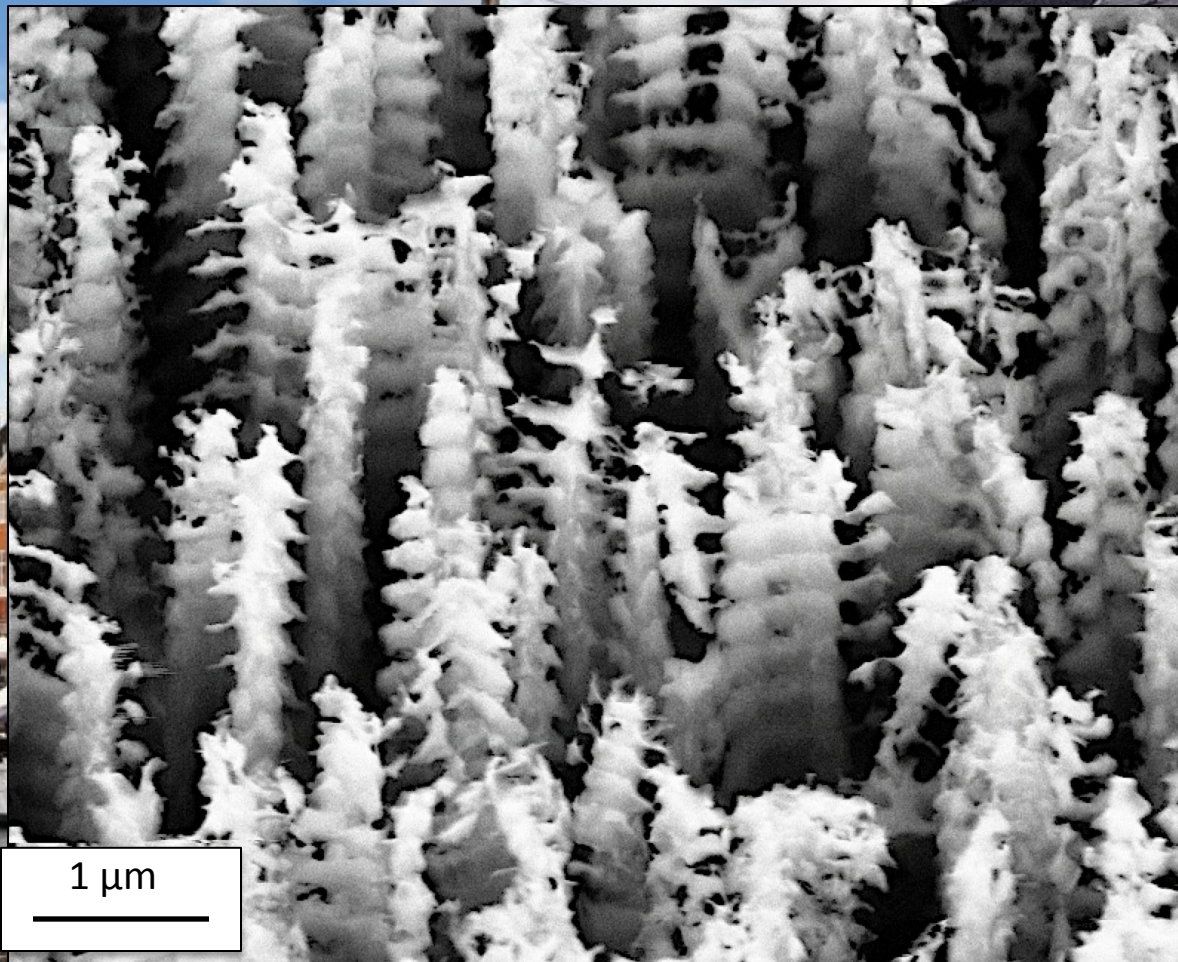
Description: DRIE Bosch process of alternating etching and passivation of a Si wafer created this pretty forest.

Submitted by: Nastasia Okulova

Affiliation: Danapak Flexibles A/S

Instrument: Supra 40VP SEM

Magnification: 33.000



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----- Contest -----

Title: Nanostar Bonsai or “Don’t leave the cleanroom or dust will make art”

Description:

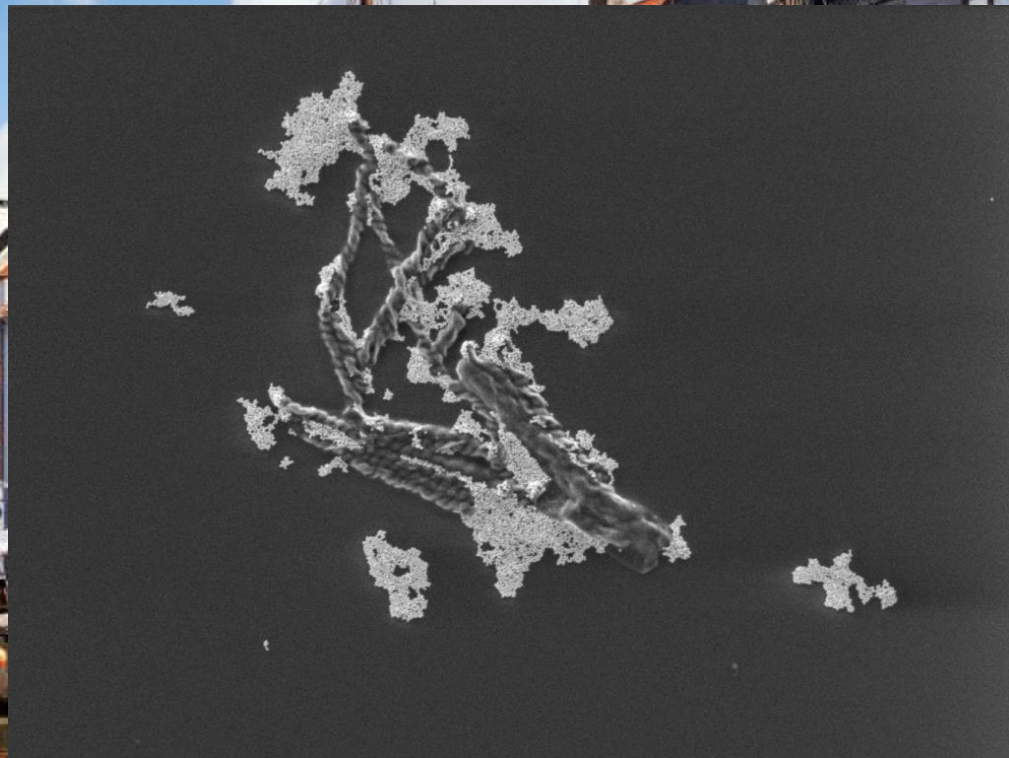
Gold nanostars found dust on top of a UV-NIL polymer to form a nanometric bonsai tree.

Submitted by: Manuel Müller

Affiliation: University of Hamburg

Instrument: Zeiss Crossbeam 550

Magnification: 5610X



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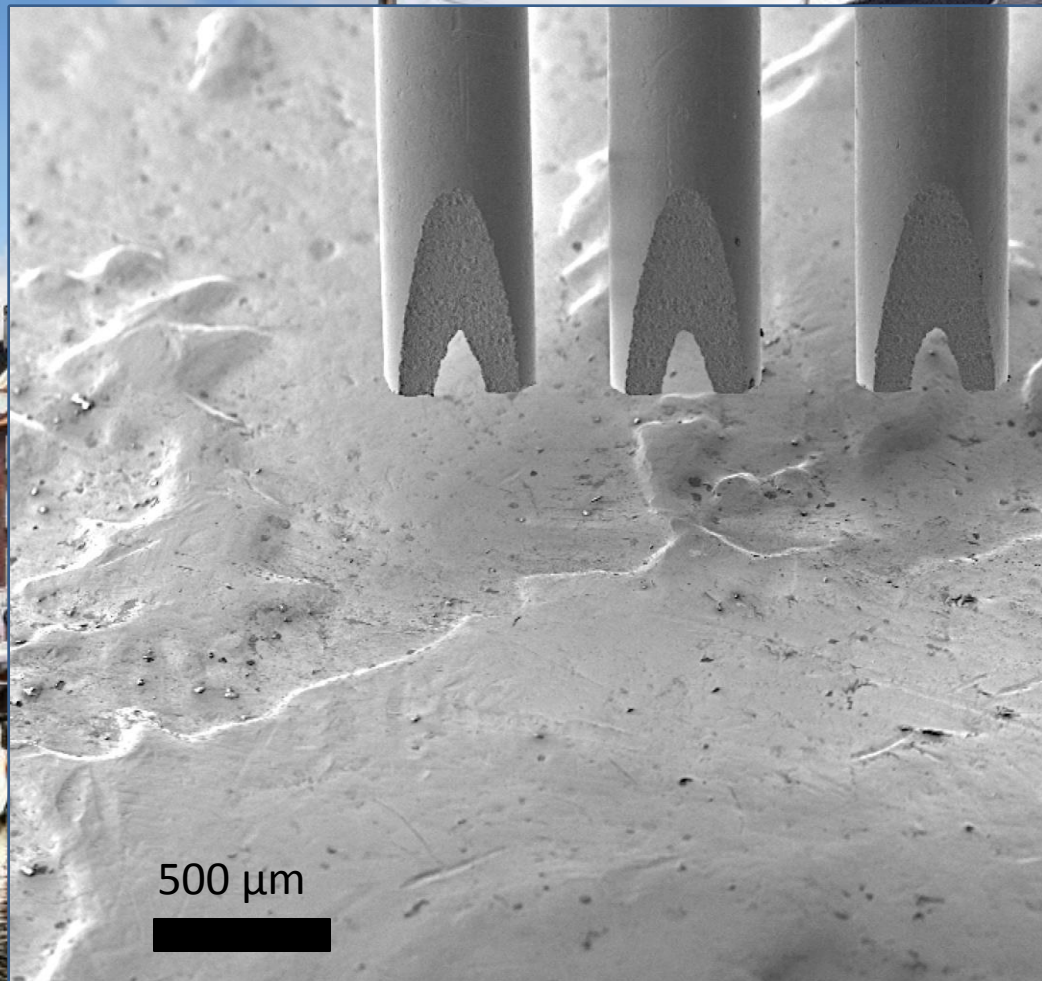
Title: Metal rain over Denmark

Description: The nozzles from the Gas Injection System of a cross beam fly above Denmark on the map of a euro coin.

Submitted by: Irene Fernandez Cuesta
Affiliation: CHyN / Hamburg University
Instrument: CrossBeam 550L, Zeiss
Magnification: 26x



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Title: Growing unicorns

Description:

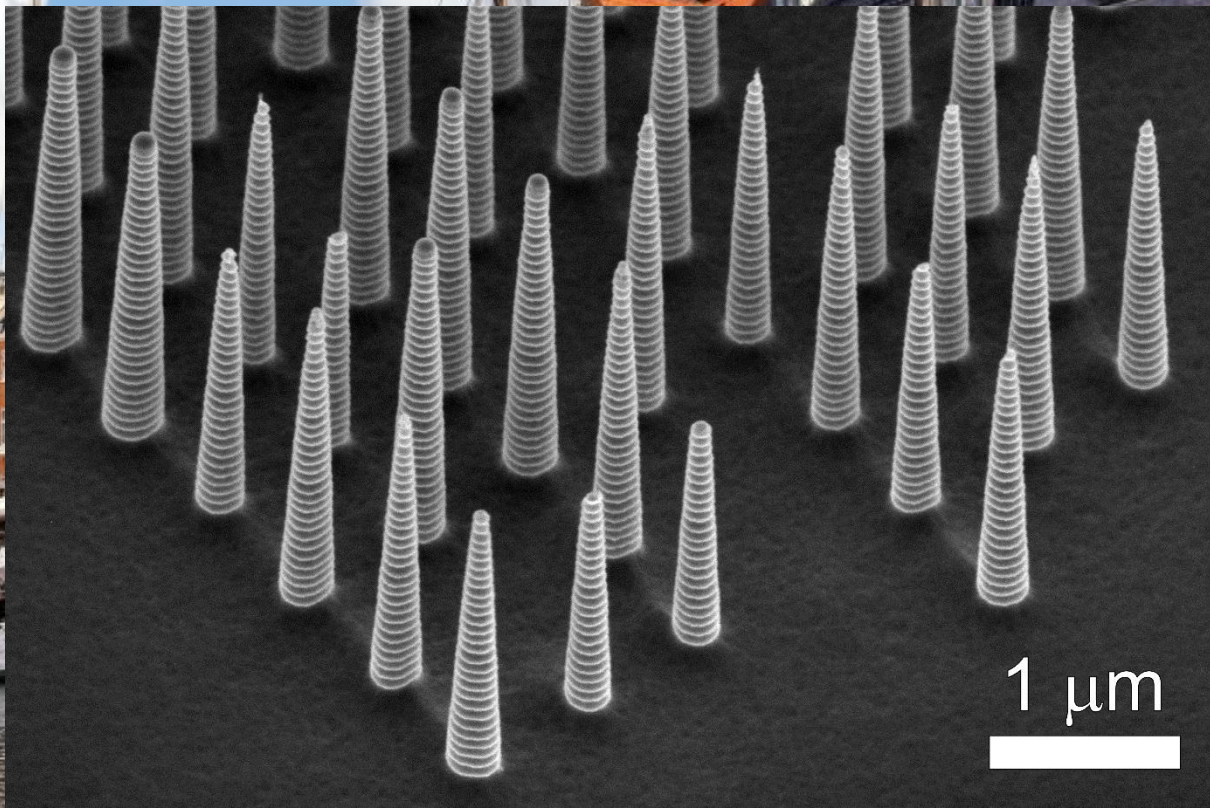
This SEM image shows unicorn horns produced by EBL and dry etching. Here we were looking for the control of the scalloping during the etching of Si cones.

Submitted by: Jordi Llobet

Affiliation: INL

Instrument: FEI, Nova NanoSEM

Magnification: 20 000 x



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----- Contest -----

Title: Carbon-henge

Description:

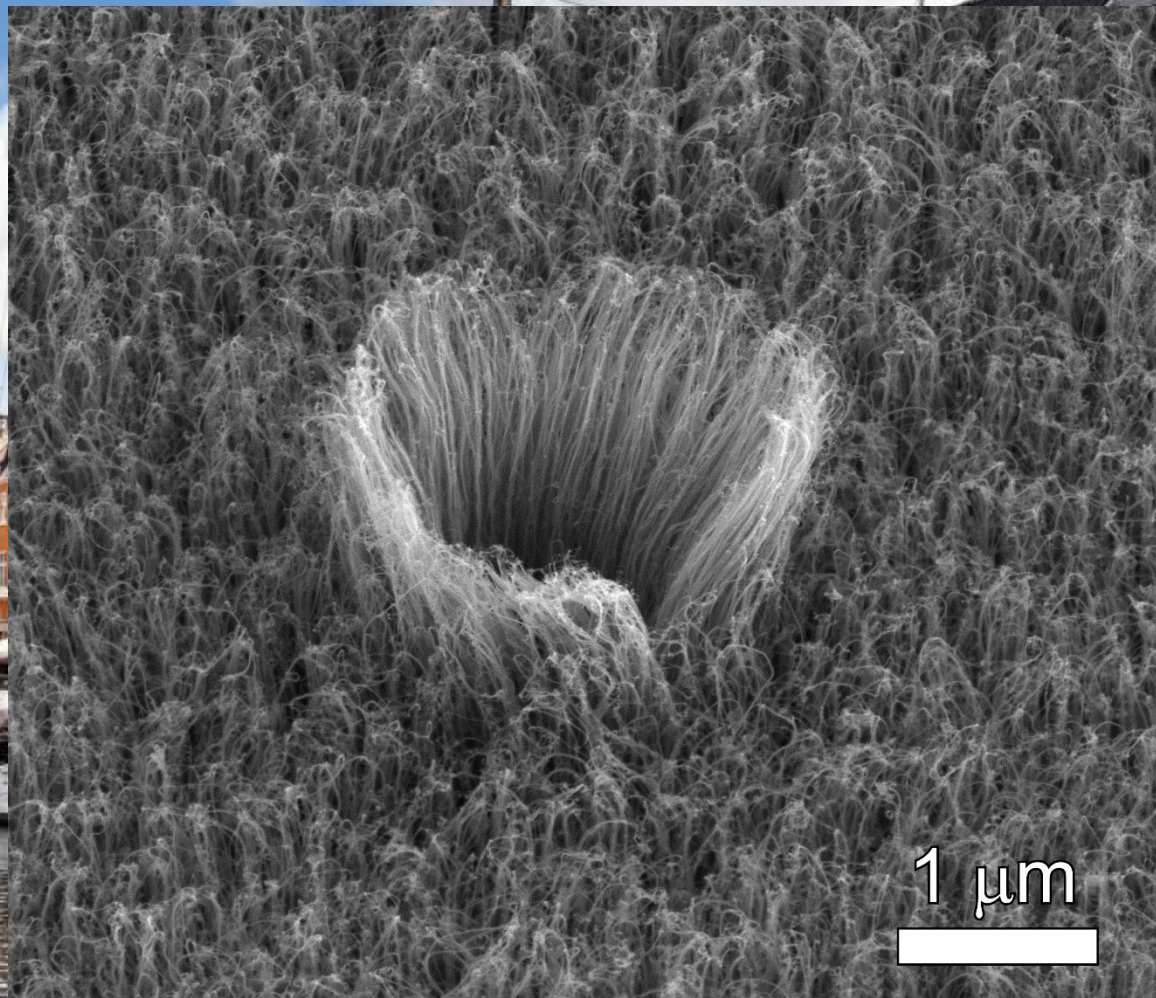
This SEM image shows a CNT nano-model of the Stonehenge. This is an image made during the growth optimization of dense CNT coverings.

Submitted by: Jordi Llobet

Affiliation: INL

Instrument: FEI, Helios NanoLab

Magnification: 25 000 x



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Title: A roaring nano-wolf

Description:

A dirt particle, it was found roaring while exposing sub-20 nm HSQ lines.

Submitted by: Muhammad Bilal Khan

Affiliation: Helmholtz Zentrum Dresden

Instrument: Raith e-line

Magnification: 18 KX

