MicroNews

San Francisco Microscopical Society Volume 11, #4 November 2016

VIEW

I N **No**

View is to encourage all of our readers to find a microscope slide and take a good look at what you observe. To see clearly at a high magnification is both a skill and a privilege since it involves a expensive instrument.

Tuesday, NOVEMBER 22, 2016

Microscopic Protozoans & Other Life Forms

The AmScope Micro. Camera by H. Schott

7:30 PM-9 PM. Refreshments and socializing beginning at 7 PM. Room 110, First Floor at Merritt College: (New Science and Health Building, Barbara Lee Science and Allied Health Center, Building S.

Merritt College,

12500 Campus Drive, Oakland, CA.
(Bring $2 in quarters for on-campus parking.)

ZEISS Celebrates 200th Birthday of Its Founding Father, Carl Zeiss

Weimar, (an important city in Germany where Carl Zeiss lived) was deemed the cradle of national culture in the early 19th century but Weimar was more a city of craftsmen. The city chiefly owed its economic prowess to its craftsmen.

Carl Zeiss left his home city at Easter 1834 and chose a nearby destination to pursue his further career, the city of Jena, a good 20 kilometers east of Weimar and the seat of the state university.

The university in Jena formed the Cives academici, i.e. students, professors and other persons associated with the university, all of whom had their own jurisdiction and constituted quite a formidable economic power despite accounting for less than one fifth of the city's population.

In 1845 Carl Zeiss returned to Jena but before he could begin to consider establishing a business, Zeiss needed a residence permit. The simplest way to obtain one was to enroll at the university. It was not until 10 May 1846 that Zeiss submitted a request with the grand ducal provincial headquarters to grant him a permit. Despite his excellent references, the Weimar building authority summoned him to their headquarters to assess his suitability to be a mechanic. In his responses, Zeiss made no secret of the fact that he considered the exam questions as nothing more than an impertinence and a waste of time. The authority was clearly offended at his attitude and initially put his request to one side.

On 21 October, an impatient Carl Zeiss inquired as to its status. Only then did the building inspector in charge refer to his request once more. From that point on it was plain sailing: on 19 November 1846, the provincial headquarters in Weimar granted Zeiss a permit and informed the Jena city council; on 26 November, Zeiss received word from the council and on 8 December, he became a citizen of Jena.

On 17 November 1846, mechanic Carl Zeiss, who was thirty years of age at the time, opened a small workshop and store in Jena's Neugasse (New Street) No. 7. Equipped with theoretical knowledge and work experience, as well as contacts in the fields of natural sciences and mathematics at the University of Jena, within just a few months, Zeiss had established a customer base for the servicing or customized production of scientific tools and instruments. In his shop he also provided glasses, chemical weighing scales, drawing instruments and telescopes. The positive development of his business in the first year inspired Zeiss to hire journeymen and apprentices in 1847. He also rented two rooms in Wagnergasse No. 34 to do his work.

Fortunately for Zeiss, a single advertisement proved to be sufficient to attract someone who would go on to play a key role in the company's success: August Löber (1830–1912).

The son of a craftsman, Löber was already 17 and therefore theoretically too old to apply, but the death of his father in January 1847 had left him in a position of genuine hardship. There is no record of whether this influenced Zeiss's decision to employ him or indeed whether anybody else even applied for the job in the small town of Jena.

That summer, following the advice of his teacher, the botanist Mattias Jacob Schleiden, Zeiss devoted his attention to the building of simple microscopes. In September 1847, he produced the first low-power microscopes.

By the beginning of the 1850s, the demand for observation instruments from the Zeiss Workshops increased due to a good reputation among microscopists who recognized their meticulous workmanship. The time-consuming trial-and error method required to build optical systems initially kept Zeiss from building systems with higher magnification, particularly as he was convinced that there must be some scientific way of determining the individual elements of the optical systems. However, to meet the competition he was forced to build compound microscopes in the traditional way from 1857 onwards.

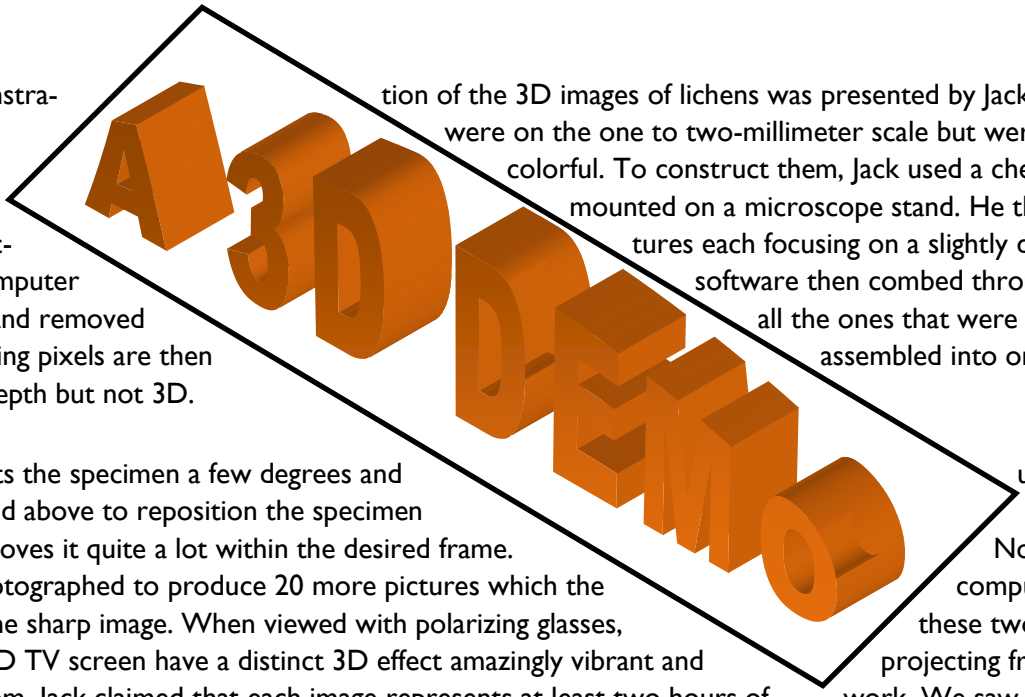
In the second half of the 1860s, Zeiss persuaded private lecturer for physics at the University of Jena, Ernst Abbe, to tackle the task of creating a mathematical foundation for designing microscope objectives. The collaboration of the two men started with Abbe suggesting that the lens elements should already be tested during the work process with the measuring instruments he had developed for that purpose. He recommended that the optical and mechanical work processes should be separated in microscope construction. At the end of the 1860s, Abbe turned his attention to the calculation of optical systems.

It took him five years to prove that increasing the size of the aperture perfects the function of the microscope. The physicist saw that the wave nature of light sets natural limits to the recognition of fine structures which are smaller than half the wavelength of light. During these examinations, Abbe found the formula for the sine condition as a criterion for sharp imaging in the area around the optical axis. The extremely complex theoretical work and practical experiments brought the Zeiss Workshop to the limits of its capabilities.

Little is known about what Carl Zeiss was like as a person. Records suggest that his elder brother's wife introduced him to the family of a clergyman named Schatter who lived in the town of Neunhofen in Thuringia. On 29 May 1849, Zeiss married the clergyman's daughter, Bertha Schatter. The couple's wedded bliss was short-lived, however: Bertha died the day after giving birth to her first son Roderich on 23 February 1850. She was just 22 years old.

Fortunately, Zeiss was able to call on family assistance once again. Bereft of his mother, Roderich was initially taken in by Zeiss's parents-in-law in Neunhofen. (Continued Pg 4)

The Genral Membership Meeting of SFMS was held at Merritt College on September 13 and was shared with other organizations including the Lichen Society and the Merritt Microscopy Club members. As a consequence the room on the first floor of the new science building comfortably accommodated the twenty people who came to see the 3D Microscopy Of Lichens slide show. I took a seat near the front and centered on the large TV screen at the front of the room so that I could experience the full effect of the expected 'sense of depth'. I was not disappointed.



The demonstration of the 3D images of lichens was presented by Jack Muzatko. Most of the images were on the one to two-millimeter scale but were startlingly beautiful and colorful. To construct them, Jack used a cheap electronic camera mounted on a microscope stand. He then took a series of twenty pictures each focusing on a slightly different depth of focus. Computer software then combed through all these many pixels and removed all the ones that were "out-of-focus". The remaining pixels are then assembled into one single sharp image with depth but not 3D.

He then tilts the specimen a few degrees and using the first image described above to reposition the specimen since tilting the specimen moves it quite a lot within the desired frame. Now the same area is re-photographed to produce 20 more pictures which the computer software reduces to one sharp image. When viewed with polarizing glasses, these two final images viewed on a 3D TV screen have a distinct 3D effect amazingly vibrant and projecting from the screen into the room. Jack claimed that each image represents at least two hours of work. We saw at least 35 images. The process of collecting a series of images in order to build up a 3D model or image is built into the software of most high order microscope programs and has resulted in some fancy videos of cell structures but this is the first time I have seen the 3D effect at this magnification.

Jack Muzatko is a member of the Oakland Camera Club 3D. They invite you to view, share and discover 3D photography at their free meetings held on the third Monday evening of each month (except December). For details of their next meeting go to their website www.oaklandcameraclub.org . Membership is $20.– annually. Next meeting is at 8:00—10:00 PM, at The Albany Community Center, 1247 Marin Avenue, Albany, CA, near Masonic. HS

3D PHOTO DEMONSTATION

Jack Muzatko is scheduled to demonstrate his 3D micro-photography of lichens at the FUNGUS FAIR held at the SF County Fair Building (formerly called the House of Flowers) in Golden Gate Park on Sunday, December 4th, 10 a.m. to 5 PM.

For additional information of this event, please see other articles in this issue.

CAMERAS

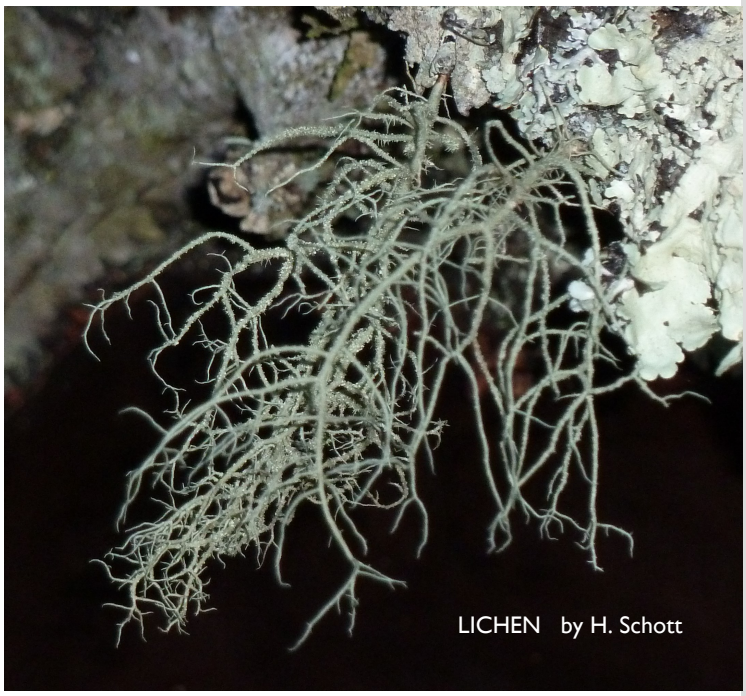
3D CAMERAS: The Fugi W3 digital camera is available from Amazon and other dealers. Other brands include the Lumix 3D1, HTC EVO 3D, and Nintendo 3DS. The Fuji W3 is popular at the Oakland Camera Club.

HTC EVO 3D is an Android phone that takes 3D pictures. Lumix 3D1 is a versatile Panasonic camera capable of two-video-cameras in one with dual independent lenses. It also can be a 3D video camera, or a 3D still camera or a HD video camera that captures high-resolution still images simultaneously.

MICROSCOPY AT THE S.F. FUNGUS FAIR

Sunday, December 4, 2016 S. F. Fair Building, next to Arboretum

The Fungus Fair is a colorful and interesting science event because it has many unusual and unexpected facets for the public to explore. For the camera enthusiast there are lovely arrangements of fungi gathered into tableaus that resemble their natural environment. Close-ups of some of the many specimens freshly gathered and stored overnight will reveal the many structural intricacies that distinguish the various families of fungi. If your interest and preference is toward fungal gastronomic experience, cooking demonstrations and how to cultivate your own mushroom garden in your basement will be demonstrated. It might also be wise to study the toxicology display and talk with the people interested in psychedelic fungi.



LICHEN by H. Schott

Lichens are an important subgroup of plants that are fungi cooperating with algae to the benefit of both species, a process called symbiosis. They are of interest to both amateur and professional botanists. Take some time to learn how these ubiquitous plants can be recognized and studied. The Lichen Society will have an extensive display in conjunction with the SF Microscopical Society and the Merritt College Microscopy Club.

SFMS MEMBERS are encouraged to RSVP to irenewinston@comcast.net to indicate your preference for helping out a couple of hours either in the morning or the afternoon, on December 4th, 2016. If you volunteer early enough, a name badge will be prepared and you will be admitted for free.

As in recent years, the fair will be held at the San Francisco Fair Building, next to the Arboretum in Golden Gate Park, 1199 9th Ave (at Lincoln). Dogs or other pets are not allowed inside the SF County Fair Building,

ODDS AND ENDS AND OTHER SCRAPS

The Prussian naturalist Alexander von Humboldt (1769–1859) is all around us.

"Humboldt carried this kind of hands-on experimentation to manic extremes in his voracious quest for total knowledge. He drank river water (the Orinoco was particularly disgusting, while the Atabapo was "delicious"), chewed bark, copied and translated scientific manuscripts, made astronomical observations, gauged the blueness of the sky with a cyanometer, transcribed the vocabularies of indigenous tribes, and sketched Incan monuments and hieroglyphs of ancient civilizations deep in the Amazonian rainforest. He studied his own lice with a microscope." (From a September 15, 2015 book review by Nathaniel Rich of: **The Invention of Nature: Alexander von Humboldt's New World** By Andrea Wulf

UNKNOWN FUNGUS by Steve Schott
Santa Barbara, January 12, 2016

(From Page 2) Grandmother Therese Schatter looked after her newborn grandson until she died in February 1851, almost exactly one year after her daughter passed away. Zeiss then entrusted Roderich's care to his second-eldest sister, Hulda, who also seems to have spent much of her time in Neunhofen.

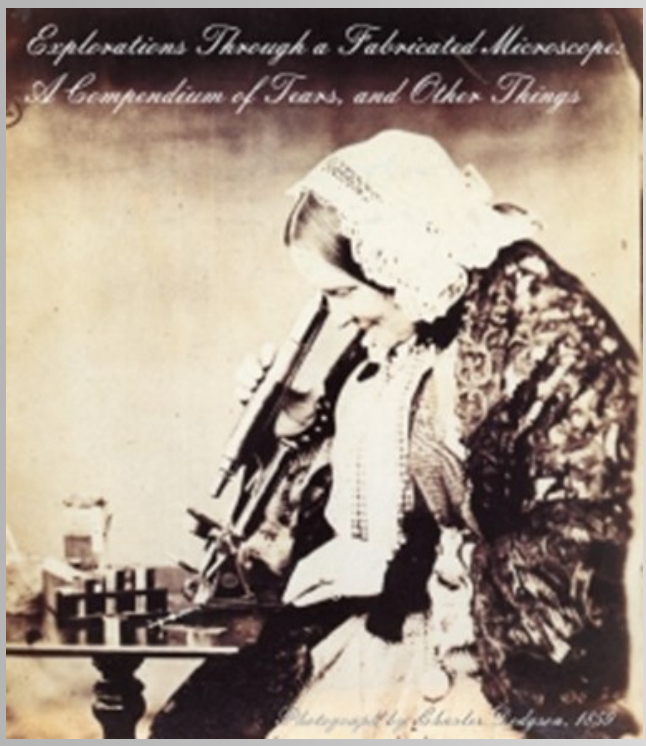
In 1853, Zeiss remarried, this time to Ottilie Trinkler (1819–1897), the daughter of a clergyman from the town of Triptis in eastern Thuringia, who was distantly related to Zeiss's first wife. Carl Zeiss himself subsequently referred to both his wives affectionately as "spiritually very much country folk." His marriage to Ottilie produced three children: Karl Otto (1854–1925), Hedwig (1856–1935), and Sidonie (1861–1920). To be continued.
(*This article is a synthesis of paragraphs found on the Zeiss web site sometimes edited to condense the material.*) HS

INCLUDING A MICROSCOPE WAS
THE HEIGHT OF
VICTORIAN PARLOR FURNITURE

For a moment, let your imagination place you back in your great-grandfathers living room. He would have called it a parlor and it would have been, at least in a middleclass household, the place where guests were entertained and where the family gathered to read and hold conversations. Absent from the furnishings would have been radios, computers, tablets, telephones and television set, record players and possibly electric outlets and lamps. For entertainment the family would have used books, newspapers, magazines, and musical instruments and some would have owned a microscope similar to the one illustrated on this page. What sort of specimens did they investigate? Often, without a disciplined plan they looked at everything that they could find and if tears needed to be accumulated in small vials and then dried prior to viewing under the microscope, that procedure was followed with great care.

Do you recall reading "Alice in Wonderland"? It contains the famous nonsense poem ***Jaberwocky***.

'Twas brillig, and the slithy toves
Did gyre and gimble in the wabe:
All mimsy were the borogoves,
And the mome raths outgrabe.



The author was Charles Dodgson, a.k.a. Lewis Carroll, who also enjoyed photography and took the portrait of his aunt looking through his microscope in 1859. His microscope was part of the Morgan Library's exhibit in New York that ended in August 2016.

Dodgson looked at a variety of organisms including protozoa and insect larvae with his microscope and in a letter to his sister Elizabeth, he wrote, "This is a most interesting sight, as the creatures are most conveniently transparent, and you see all kinds of organs jumping about like a complicated piece of machinery … Everything goes on at railway speed, so I suppose they must be some of those insects that only live a day or two, and try to make the most of it."

The microscope was manufactured in 1859 by Smith & Beck of London where Lewis Carroll (Dodgson) lived. He bought the latest microscope of his day and treasured it, taking good care of it for the rest of his life.

THE SFMS MICROSCOPY SLIDE COLLECTION CATALOG

400 + SLIDES: A SAMPLE

29-4726	$	6.00	Staphylococcus aureus w.m.	BACTERIA	CAROLINA
29-4906	$	7.00	Mixed Blue-Green Algae w.m.	ALGAE	CAROLINA
29-4918	$	7.00	Water Bloom w.m.	ALGAL BLOOM	CAROLINA
29-5366	$	9.00	Actinosphaerium w.m.	PROTOZOAN	CAROLINA
29-5468	$	12.00	Entamoeba histolytica Cysts smear	PROTOZOAN, PARASITIC	CAROLINA
29-6548	$	6.00	Spirogyra	ALGAE, FILAMENTOUS	CAROLINA
29-6620	$	8.00	Volvox w.m.	PROTISTA	CAROLINA
29-6632	$	8.00	Volvox Flagella w.m.	PROTISTA	CAROLINA
29-7040	$	7.00	Vorticella w.m.	CILIOPHORA	CAROLINA
29-7782	$	9.00	Rhizopus Combination w.m.	FUNGUS	CAROLINA
29-7968	$	7.00	Penicillium w.m.	FUNGUS	CAROLINA
29-8212	$	7.00	Lycoperdon Pufball sec.	FUNGUS	CAROLINA
29-9028	$	10.00	Moss, Archegonial Head, Mnium with venter & stalk l.s. 12µm	PLANTS	CAROLINA
30-4066	$	7.00	Elodea Leaf w.m.	PLANT CELL ANATOMY	CAROLINA
30-4270	$	9.00	Germinated Pollen w.m.	PLANT SPORE	CAROLINA
30-4532	$	7.00	Lily Anther c.s.	PLANT ANATOMY	CAROLINA
30-6064	$	7.00	Hydra, Budding Adult w.m.	CNIDARIA (Phylum)	CAROLINA
30-6216	$	10.00	Aurelia Planula w.m.	CNIDARIA (Phylum)	CAROLINA
30-6502	$	15.00	Schistosoma mansoni, Male w.m.	FLATWORM, PARASITIC	CAROLINA
30-7372	$	7.00	Cyclops w.m.	ARTHROPODA	CAROLINA
30-7408	$	12.00	Gammarus w.m.	ARTHROPODA	CAROLINA
30-7438	$	8.00	Megalops of Crab w.m.	ARTHROPODA	CAROLINA
30-8004	$	15.00	Honey Bee Composite w.m.	INSECTA	CAROLINA
30-8088	$	10.00	Culex w.m. Mosquito	INSECTA	CAROLINA
30-8118	$	6.00	Drosophila	INSECTA	CAROLINA
30-8124	$	8.00	Drosophila, Male & Female	INSECTA	CAROLINA
30-8470	$	6.00	Cycloid Scale w.m.	FISH (CARP OR SALMON)	CAROLINA
31-1332	$	9.00	Frog 5-7 mm w.m.	EMBRYOLOGY	CAROLINA
922518	$	11.00	Mosquito Head w.m.	INSECTA	WARDS

FOR SFMS MEMBERS IN GOOD STANDING:

TO CHECK OUT UP TO 12 MICROSCOPE SLIDES

LISTED ON OUR WEB SITE (WWW.SFMICROSOC.ORG)

Contact: Henry Schott, Slide Librarian, 20 Drake Lane, Oakland, CA 94611-2613 510-339-9609 hschott@aol.com. Please list the specific catalog number for the slides you want.

HOW TO ACCESS THE COLLECTION

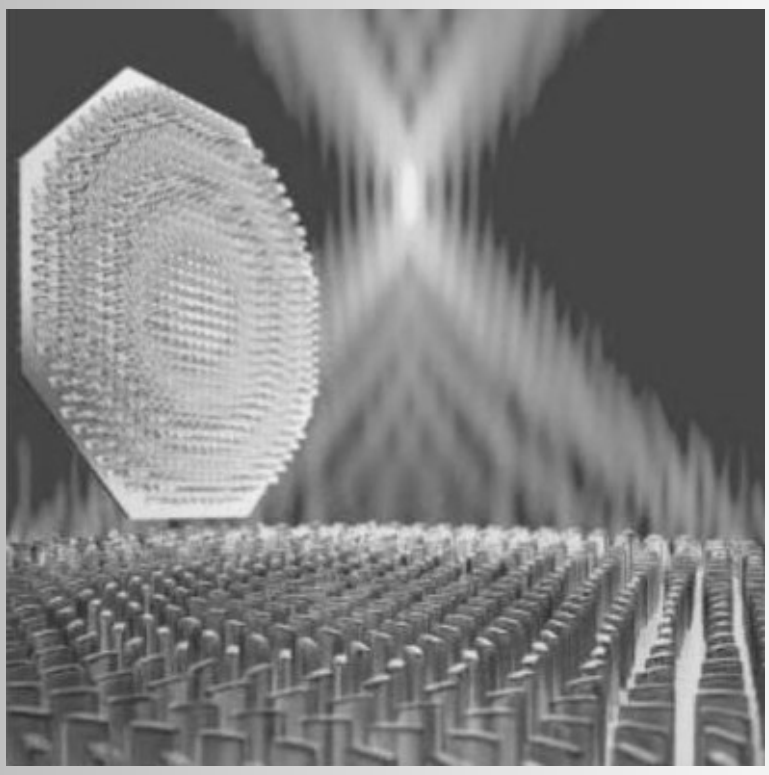
The September 2016 issue of Micro News provided an overview of the recently acquired slide collection. The slides listed on the left represent the slides that we received as a donation from Mary Ann Scott and will be used to explain how the collection was cataloged so that members can access the available slides. (Most of you are familiar with the abbreviations: w,m, = whole mount, l.s. = long section, sec. = section). In the first column is the catalog number provided by the manufacturers which are listed in the fifth column and here are mostly Carolina Biological. The second is the estimated replacement cost in 2017 including shipping and taxes rounded to whole dollars. The cost does not include the secretarial work required to place the order. A flat average replacement charge has been assigned slides that are no longer available.

The third column is the description found on the slide label. The fourth column contains one of the following: the phylum or class of the organism, the common category such as FUNGUS, or the discipline of study such as ECOLOGY or EMBRYOLOGY.

Searching the list on our web site by subject or category should lead you to slides of interest. H.S.

OPTICAL COMPONENTS SHRUNK DOWN TO A PLANAR STRUCTURE

The reason that microscopy is interesting and constantly evolving is rooted in the fact that light (or electromagnetic energy) can be bent or refracted. For a long time we have been satisfied with the magnification that lenses provide and we have learned how to combine various types of glass, filters and light sources to minimize aberrations. Now a whole new method of bending light is under development that is both exotic to our experience with light and perhaps uniquely practical. While even small and thin lenses are clearly 3D objects, these subwavelength thick arrays are considered to be 2D in comparison to other optical systems.



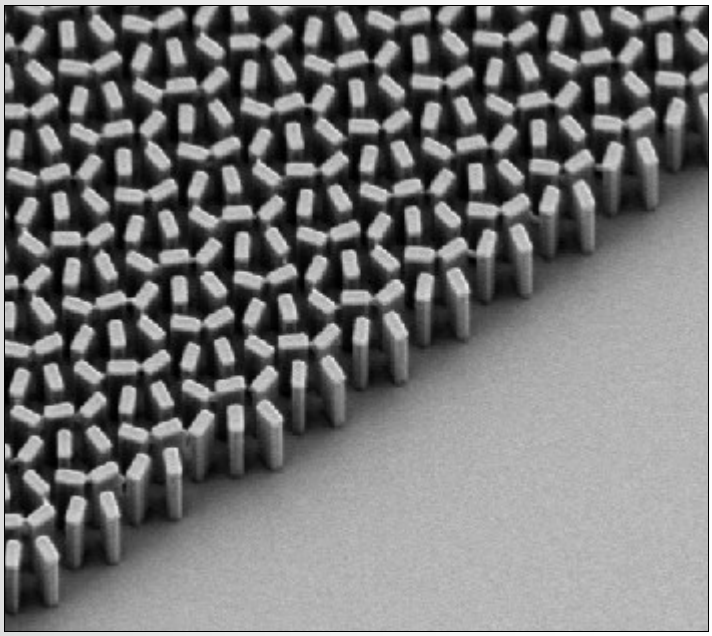
METASURFACE

Khorasaninejad *et al.* have shown that arrays of titanium oxide (TiO) can function as antennas for light. The arrays are constructed by growing small pillars or fins of TiO on planar surfaces creating structures called metasurfaces or metalenses. Fabrication is accomplished by the same techniques used in the manufacture of electronic chips and the metalenses so produced can function as high-end optical lenses.

The composite graphic shows that the array of TiO fins can be grown in a pattern that deflect light and bring it to a focus. The octagon on the left represents such an array that behaves as a lens.

These planar arrays are called metasurfaces and when arranged in circular patterns, metalenses. Two millimeter wide metalenses have been constructed that provide magnifications as high as 175X with image qualities comparable to state-of-the-art commercial objectives. Metalenses will have widespread application in laser-based microscopy, imaging and spectroscopy as well as cameras and optical devices.

Using silicon instead of titanium oxide, the range of metalenses could be expanded into the infrared and with other bases into the ultraviolet. Stacking the metalenses may also improve performance. Because of their



SFMS

Volume 11, #4 November 2016

Stamp

FROM: **Micro News**
San Francisco Microscopical Society
20 DRAKE LANE
OAKLAND CA 94611-2613

MEMBERSHIP INFORMATION

To join the Society or pay your dues:
fill in the form available at **www.sfmicrosoc.org**

Mail it to : SFMS Treasurer
435 Melrose Ave
San Francisco, CA 94127
Make check out to SFMS.
Dues are $12. per calendar year. **Pay now for 2017**
Life membership is $144.00

WWW.SFMICROSOC.ORG

NEEDED: Members to serve on the SFMS Board.

TIME TO RENEW YOUR MEMBERSHIP. STILL ONLY $12-
NOTE MEMBERSHIP INFORMATION ON LEFT SIDE.

GENERAL MEMBERSHIP MEETING TUESDAY NOVEMBER 22 AT MERRITT COLLEGE. (SEE PAGE 1)

TO:

The S. F. Microscopical Society

SFMS dates back to 1870-72 when it was founded but as a result of the 1906 earthquake it was disbanded and not revived until the 1950s. It has been active over the past sixty years and has served the wider community of the nine counties during that time. For the past fifteen or more years, our base has been at the Randall Museum in SF but this year the Randall is being rebuilt and thus we have often met at Merritt College in Oakland. Merritt has a new building for the sciences in which the first floor is devoted to light microscopy and cell culture. 2017 will see us holding some meetings at the Randall.

We have four or the five elected officers that comprise the board of directors: Peter Werner, President, Bill Hill, Vice President, Myron Chan, Treasurer, Africa Williams, Corresponding Secretary, and (Vacant), Recording Secretary. Henry Schott is the editor of the Micro News and is not an elected officer. Elections are held at the January General Membership meeting. Board meetings are announced and open to all members. General Membership Meetings are held five times a year, usually meeting on the second TUESDAY, 7:00 to 9:30 PM. of September, November, January, March & May. The location is announced by e-mail.

The Society's newsletter is the **Micro News**, published four times each year and mailed to members. In the eight-page newsletter is information about the upcoming meetings and activities of the board as well as any items that the officers or the editor want to share with the members. Members are encouraged to share what they find interesting in microscopy by providing pictures and text. Sometimes it is difficult to get out the newsletter so please help by sharing any material of interest.

JOIN THE SOCIETY NOW FOR 2017,
PLEASE PROVIDE THE FOLLOWING INFORMATION:

Full Name
Mailing address and zip code
Phone number
e-mail address
Year of birth

Membership is for the calendar year. Enclose a check for $12.- (or multiple thereof for each subsequent year, i.e. $24.– for two years) . Life membership is $144.-.

Make the check payable to:

S. F. Microscopical Society

Mail to: