Cathay June 2012

www.cathayradio.org

Revised 6/19/2012

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Mission: The Cathay Amateur Radio Club is basically an active social club of Ham Radio Operators and their spouses. We support local community requests for HAM emergency communications. Several of us are trained in CPR/ First Aid and are involved with community disaster preparedness.

Monday Night Net Time: 9 PM PST, Frequencies: 146.67MHz -600KHz PL85.4 and 442.70 +5MHz PL 173.8. The repeaters are linked. The CARC Monday night net is the best way to find out the latest club news. All check-ins are welcome.

Message from the President: George Chong, *W6BUR* *(As of 5/28/2012)*

Hello Cathay Amateur Radio Club Members and Friends;

ARRL FIELD DAY: We (George - W6BUR and my wife Hetty - WB6SHU) are graciously opening our home in the Oakland hills for a combination pot luck lunch and ARRL Field Day event on Saturday June 23rd, 10 AM to 2 PM.

Come and bring some of your favorite food to share – perhaps enough for 8 to 10 servings. Soft drinks, cups, plates, napkins, and utensils will be provided.

Both of my VHF antenna and UHF antenna are high gain collinear types that provide between 5 to 6 dB of gain. The antennas will be available for connecting your portable radio or HT if you wish to make some contacts. The antenna feed lines are the standard 50 Ohm - RG8/U Coax with a UHF male connectors. For you folks that wish to connect their HT to my antenna feed line, please bring the appropriate adapter. Should you need a power output check on your HT's, my SWR Bird Model 43 with a 50 Ohm dummy load will be available

You are also welcome to use my HF transceiver that is dialed into the 40 meters band, frequency 7.223 MHZ, lower side band. The QTH site is at a 1,200 foot elevation – great for transmitting and receiving.

Don't for get to bring your latest HAM gear so we can show it off to each other and compare our gear. Russell Chong - KJ6WGR has the latest Baofeng UV-5R for a show and tell. As of April 21, 2012 the 5 watt dual band 136-174/400-480 MHz Baofeng UV-5R transceiver has been granted an FCC Part 90 certification (FCC ID: ZP5BF-5R).

Here is the full URL to the FCC Part 90 Certification of the Baofeng UV-5R:
https://apps.fcc.gov/oetcf/eas/reports/GenericSearch.cfm
Enter Grantee Code: **ZP5**, Product Code: **BF-5R**

Please contact George W6BUR (**W6BUR@comcast.net**) and/or Bill Chin (**bill.kc6pof@comcast.net**) no later than Saturday June 16th if you are able to attend.

If you plan to come to the pot luck please indicate how many guests, and what you might be bringing – whether a salad, appetizer, main dish, dessert, etc. A separate email invitation to CARC members will be sent out with the address and directions to our house.

We (Hetty - WB6SHU and George – W6BUR) will be monitoring CARC designated Channel 1 and Channel 2 to provide additional directions. Hetty would like very much to see your ladies; the event is not just for you HAM guys as she also wants company too. She has some lovely potted plants that she wishes to give away for you to brighten up your home.

After our Pot Luck lunch, please follow me to another HAM radio site in the Oakland Hills known as ORCA. You will see a real Field Day site in action; it is only ten minutes away.

Upcoming Technical HAM Session: Edison Fong – *WB6IQN* is hosting a Technical HAM Session at his home in Sunnyvale, CA on July 14, 2012. Free lunch will be provided and a raffle will be held for prizes. Be on the lookout for the following July 2012 CARC newsletter for additional details on the Technical HAM Session.

Featured Tech Article: This month's featured technical article is about a break through with the manufacturing of three-dimensional microchips.

Special Report Article: A visit to the US Geological Survey Open house in Menlo Park, CA

Public Service Announcements

Tony – KR6EG

ACS Info

The Auxiliary Communications Service (ACS) was organized by the San Francisco Office of Emergency Services (OES) following the 1989 Loma Prieta Earthquake to support the communications needs of the City and County of San Francisco when responding to emergencies and special events. The Auxiliary Communications Service holds General Meetings on the third Tuesday of each month at the San Francisco Emergency Operations Center, 1011 Turk Street (between Gough Street and Laguna Street), from 1900 hours to 2100 hours local time. All interested persons are welcome to attend.

The ACS Net

The ACS Net begins at 1930 hours (7:30 p.m.) local time each Thursday evening, on the WA6GG repeater at 442.050 MHz, positive offset, tone 127.3 Hz. The purpose of this net is to practice Net Control skills, practice checking in with deployment status in a formal net, and to share information regarding upcoming ACS events. Guests are welcome to check in. ACS Members should perform Net Control duty on a regular basis. On the second Thursday of each month, the net will be conducted on the output frequency of the WA6GG repeater, 442.050 MHz no offset, tone 127.3 Hz, simplex.

For more information, please attend an ACS meeting, check in on a net, or call 415-558-2717.

Upcoming meetings: Tuesday 7pm, June 19, 2012
Tuesday 7pm, July 17, 2012

Gilbert – KJ6HKD

Free Disaster Preparedness Classes In Oakland: http://www.oaklandnet.com/fire/core/index2.html

Core Boot Camp Summer 2012 is almost upon us. The normal 5 week Core classes are compress into two Saturdays and one Sunday (July 21, 28, 29). For more details check out the link: **CORE Boot Camp Summer 2012**

If you have questions about the Core class and/or Core recertification process, please contact the CORE Coordinator at 510-238-6351 or core@oaklandnet.com.

Free Disaster Preparedness Classes In San Francisco – SFNERT Taught by San Francisco Fire Department

RSVP to sffdnert@sfgov.org or call 415-970-2024 to register. Visit www.sfgov.org/sffdnert to see more about the training, other locations, and register on line.

June

30th: NERT Plan & Play Workshop, 8:45am-1:00pm, followed by potluck lunch
Red Cross Pier 54, Terry Francois Blvd.

Featured Tech Article:

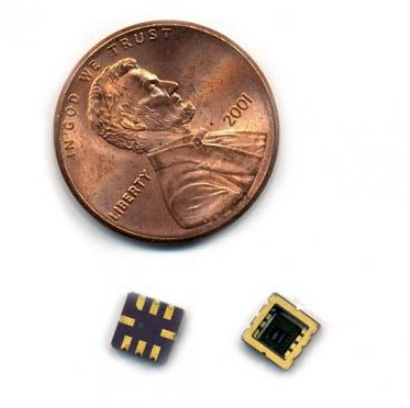
MIT News: **Tiny 3-D chips**

http://web.mit.edu/newsoffice/2012/three-dimensional-microchips-0228.html

MIT researchers develop a new approach to producing three-dimensional microchips.

Jennifer Chu, MIT News Office

February 28, 2012



A new approach helps researchers make tiny three-dimensional structures. Pictured are two packaged microchips, each with tiny bridges fabricated on their surfaces.

Microelectromechanical systems, or MEMS, are small devices with huge potential. Typically made of components less than 100 microns in size — the diameter of a human hair — they have been used as tiny biological sensors, accelerometers, gyroscopes and actuators.

For the most part, existing MEMS devices are two-dimensional, with functional elements engineered on the surface of a chip. It was thought that operating in three dimensions — to detect acceleration, for example — would require complex manufacturing and costly merging of multiple devices in precise orientations.

Now researchers at MIT have come up with a new approach to MEMS design that enables engineers to design 3-D configurations, using existing fabrication processes; with this approach, the researchers built a MEMS device that enables 3-D sensing on a single chip.

The silicon device, not much larger than Abraham Lincoln's ear on a U.S. penny, contains microscopic elements about the width of a red blood cell that can be engineered to reach heights of hundreds of microns above the chip's surface.

Fabio Fachin, a postdoc in the Department of Aeronautics and Astronautics, says the device may be outfitted with sensors, placed atop and underneath the chip's minuscule bridges, to

detect three-dimensional phenomena such as acceleration. Such a compact accelerometer may be useful in several applications, including autonomous space navigation, where extremely accurate resolution of three-dimensional acceleration fields is key.

“One of the main driving factors in the current MEMS industry is to try to make fully three-dimensional devices on a single chip, which would not only enable real 3-D sensing and actuation, but also yield significant cost benefits,” Fachin says. “A MEMS accelerometer could give you very accurate acceleration [measurements] with a very small footprint, which in space is critical.”

Fachin collaborated with Brian Wardle, an associate professor of aeronautics and astronautics at MIT, and Stefan Nikles, a design engineer at MEMSIC, an Andover, Mass., company that develops wireless-sensor technology.

The team outlined the principles behind their 3-D approach in a paper accepted for publication in the *Journal of Microelectromechanical Systems*.

Moving to 3-D

While most MEMS devices are two-dimensional, there have been efforts to move the field into 3-D, particularly for devices made from polymers. Scientists have used lithography to fabricate intricate, three-dimensional structures from polymers, which have been used as tiny gears, cogs and micro-turbines.

However, Fachin says, polymers lack the stiffness and strength required for some applications, and can deform at high temperatures — qualities that are less than ideal in applications like actuators and shock absorbers.

By contrast, materials such as silicon are relatively durable and temperature-resistant.

But, Fachin says, fabricating 3-D devices in silicon is tricky. MEMS engineers use a common technique called deep reactive ion etching to make partially 3-D structures, in which two-dimensional elements are etched into a wafer.

The technique, however, does not enable full 3-D configurations, where structures rise above a chip’s surface.

To make such devices, engineers fabricate tiny two-dimensional bridges, or cantilevers, on a chip’s surface.

After the chip is produced, they apply a small force to arch the bridge into a three-dimensional configuration. This last step, Fachin says, requires great precision.

Inner stress

Instead, the MIT team came up with a way to create 3-D MEMS elements without this final nudge.

The group based its approach on residual stress: In any bridge structure, no matter its size, there exist stresses that remain in a material even after the original force needed to produce it — such as the heat or mechanical force of a fabrication process — has disappeared. Such stresses can be strong enough to deform a material, depending on its dimensions.

Fachin and his colleagues studied previous work on microbeam configurations and developed equations to represent the relationship between a thin-film material's flexibility, geometry and residual stress.

The group then plugged their desired bridge height into the equations, and came up with the amount of residual stress required to buckle or bend the structure into the desired shape.

Fachin says other researchers can use the group's equations as an analytical tool to design other 3-D devices using pre-existing fabrication processes.

"This offers a very cost-effective way for 3-D structures," says Y.K. Yoon, an associate professor of electrical and computer engineering at the University of Florida who did not take part in the research. "Since the process is based on a silicon substrate, and compatible with standard complementary metal oxide semiconductor (CMOS) processes, it will also offer a pathway to a smart CMOS-MEMS process, with good manufacturability."

The group used their analytical tool to design tiny 3-D devices out of a composite silicon structure, with each chip containing highly curved or buckled microbeams. Fachin's sensors, placed on top of each bridge and on the surface of the chip, can triangulate to measure acceleration.

"For other applications where you want to go much larger in size, you could just pick a material that has a larger residual stress, and that would cause the beam to buckle more," Fachin says. "The flexibility of the tool is important."

Special Report: US Geological Survey - Open House May 19-20, 2012

Written May 28, 2012, Revised June 19,2012
By Rodney Yee

In the May 2012 CARC newsletter, Phil Wong – KG6ECC informed the CARC of the US Geological Survey Open house in Menlo Park, CA that occurs every 3 years. The next US Geological Survey Open House will not occur until May 2015.

I attended the USGS Open house and was very surprised at how much there was to see and do. I only had enough time to visit one of the many buildings that were open to the public. The event is definitely very family orientated and offered many different venues. It appeals to both big kids like me and to the very young kids.

I spent most of my time at studying the geological exhibit and was very warmly greeted by **Ron Churchill,** Senior Engineering Geologist for the California Geological Survey (a California state government agency, website: http://www.conservation.ca.gov/CGS/Pages/Index.aspx)

Ron had a 16 foot long table full of household products and the minerals samples contained in them. As I held up each mineral sample, Ron explained how that mineral is used in an accompanying household product. He went into detail as to the rarity of the mineral and area that is mined from. Naturally I hovered around the mineral sample that contained everybody favorite item: GOLD!

Pictures of mineral samples and its uses in common everyday household items

At the portable XRF Spectrometer demonstration, **Andrea L. Foster** of the USGS was showing people how she could analyze the metal composition of a person's wedding ring. It had folks in the audience thinking that the portable XRF Spectrometer could have been right out of Star Trek. On her sample table was a jar of a naturally occurring iron minerals with the consistency of fine black sand. She had collected the iron minerals lying right on the surface of Ocean Beach just above Sloat Blvd in San Francisco. I have walked right on top of it many times thinking it was just some dirty oily sand completely oblivious to its true mineral nature.

As I roamed around to other parts of the building, I met **Eric Giest** of the USGS Pacific Coastal and Marine Science Center. Eric was showing a video of a tsunami simulation model that he

developed. He explained to me why the Japan tsunami did not strike the US coast line with the same force that hit Japan. Apparently the real danger to the US pacific coastline is from the area just below Alaska and that a ring of ocean sensors blanket that very same area. The Alaskan coastal sensors would give the USGS advance warning of any dangerous earthquakes and subsequent tsunamis.

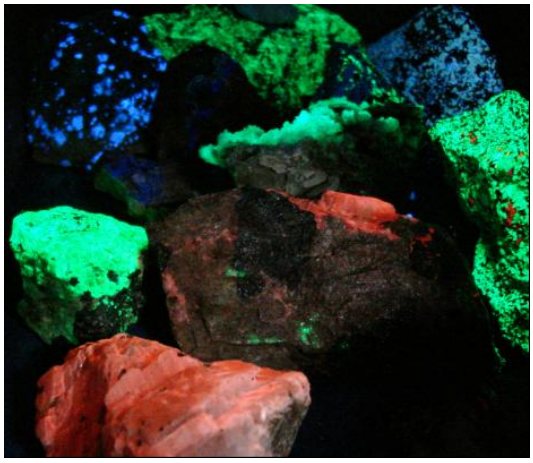
Eric explained to me how the tsunami moves in the ocean and as it gets near the shallow shoreline how the wave length of the waves shortens up and the speed picks up. Pasted up on the wall was a large map of the San Francisco bay area and the projected flooding areas should a tsunami hit the bay area.

Eduar Matla of the USGS was demonstrating how to extract copper by placing a piece of iron wire into a mild acid solution and a chunk of copper ore.

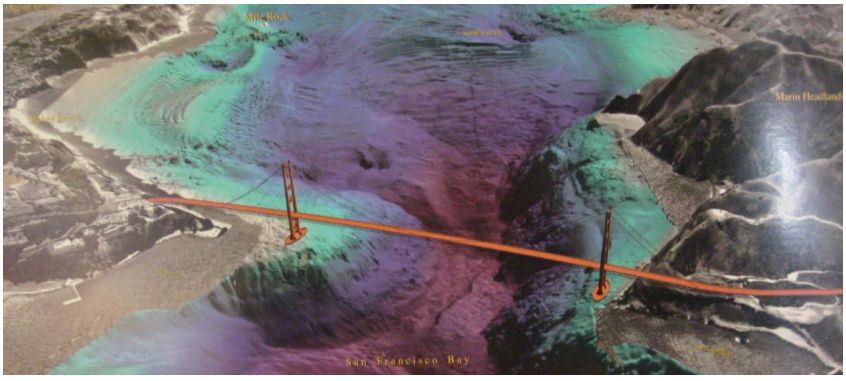
At the next USGS Open house in May 2015, our CARC club should definitely attend it and make sure we get there early to visit all the exhibits and events.

Below are pictures of interest that I took at the USGS Open House.

USGS Open House Entrance



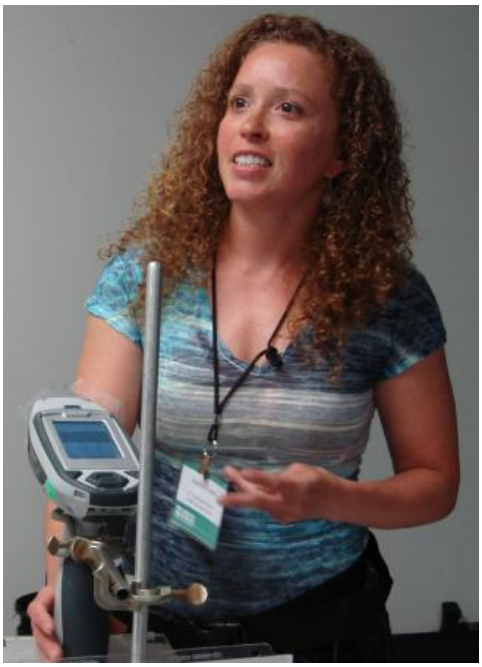
Florescence glowing rocks under a UV light



San Francisco Bay Area Seabed

Eric Giest – USGS Pacific Coastal and Marine Science Center. Behind him is a video tsunami simulation model he created.

Eduar Matla - USGS Research Geologist, demonstrating by using solution extraction method to extract copper from copper ore.



Andrea L. Foster –USGS Research Geologist, demonstrating a portable XRF Spectrometer used for chemical analysis.

Ron Churchill – Senior Engineering Geologist for the California Geological Survey, explaining how minerals are used in our everyday household products.