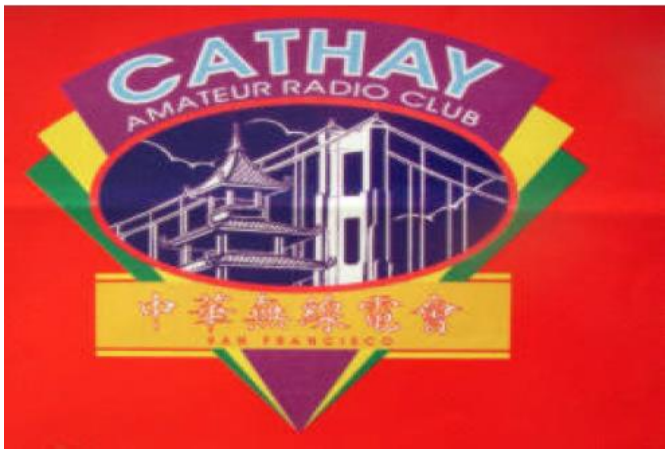


Cathay July 2022

www.cathayradio.org

President: George Chong, W6BUR **email:** *W6BUR@comcast.net*
Vice President North: Leonard Tom, *NX6E* **email:** nx6e@hotmail.com
Vice President South: Bill Fong, *W6BBA* - **email:** w6bba@arrl.net
Secretary/Membership: Rodney Yee, *KJ6DZI* - **email:** rodyee2000@yahoo.com
Editor: Rodney Yee, *KJ6DZI* - **email:** rodyee2000@yahoo.com
Treasurer: Vince Chinn aka Mingie, *W6EE* - **email:** vince@vincechinncpa.com
Web Master: Edison Fong – *WB6IQN* - **email:** edison_fong@hotmail.com
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 Local Time/PST, Repeater: WB6TCS - RX 147.210, TX 147.810, Offset +0.6 MHz, CTCSS/Tone PL100 Hz

Please note: Repeater: N6MNV UHF 442.700 Mhz, Offset +5MHz, CTCSS/Tone PL 173.8 Hz in South San Francisco is cross linked every Monday Night Net at 9 p.m. to WB6TCS 2-meter repeater.

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*

Hello CARC Members and Friends;

Many thanks to Mr. Denis L. Moore – WB6TCS for the use of his repeater for our CARC Monday Night Net.

I wish to thank our CARC members that set aside their valuable time to participate in our Monday night's nets.

Special Announcement:

Memorial Service for Bill Chin - KC6POF on Saturday August 20, 2022 at 11:00 a.m.

First Chinese Baptist Church
15 Waverly Place
San Francisco, CA 94108

Memorial Luncheon for Bill Chin – KC6POF on Saturday August 20, 2022 at 12:30 p.m.

Far East Cafe
631 Grant Ave.
San Francisco, CA 94108

Tech Article Introduction:

This new Tech Article is about a future potential novel way to improved thermal properties of IC and CPU Silicon based chips.

Please read the **Tech Section** of this newsletter for additional information.

CARC/SARES ARRL Field Day Summary Introduction:

Many thanks to Ed Fong - *WB6IQN* for hosting the June 25, 2022 CARC/SARES ARRL Field Day Event that included a free dinner and raffling of nice prizes to all the attendees.

The event turnout was very good and everybody enjoyed the delicious catered Chinese food. It was great to see everybody in person after a long 2 years wait due to COVID-19 restrictions.

Many thanks to Howard Louie - N6MNV who with very little notice volunteered to take over picture taking duties at the CARC/SARES ARRL Field Day Event. His pictures are shown in this newsletter, he is quite the photographer.

Please see Ed Fong's field day event write up and pictures at the end of this newsletter.

Chat sub s'em to all you CARC members! - George W6BUR, **CARC President**.

Public Service Announcements

HAM CRAM / HAM Licensing

For upcoming HAM Licensing locations please refer to:
http://www.arrl.org/find-an-amateur-radio-license-exam-session

Auxiliary Communications Service (ACS)

The Auxiliary Communications Service (ACS) is a unit of trained professionals who supply communications support to the agencies of the City and County of San Francisco, particularly during major events/incidents. ACS goals are the support of gathering and distribution of information necessary to respond to and recover from a disaster.

The ACS Net begins at 1930 hours (7:30 p.m. PT) 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 perform Net Control duty on a regular basis
On the second Thursday of each month, the net is conducted in simplex mode on the output frequency of the WA6GG repeater, 442.050 MHz no offset, tone 127.3 Hz.

ACS holds its General Meetings on the third Tuesday of each month from 1900 hours to 2100 hours local time. Currently meeting are exclusively conducted over Zoom during the COVID-19 pandemic, ACS looks forward to meeting in person again as soon as possible.

Upcoming meeting dates in 2022 are:

- August 16, 2022
- Sept 20, 2022
- Oct 18. 2022

Location of in person future ACS meetings are yet to be determined as the regular location is under reconstruction until January 2023. All interested persons are welcome to attend. For further information, contact Corey Siegel KJ6LDJ <kj6ldj@gmail.com>.

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

Free Disaster Preparedness Classes In San Francisco – NERT Taught by San Francisco Fire Department (SFFD).

http://sf-fire.org/calendar-special-events

TBD

+ Recertifications - Coming Soon!

Pre-register here!

https://www.eventbrite.com/e/are-you-a-nert-graduate-looking-to-recertify-pre-register-here-tickets-228380330717?aff=odcleoeventsincollection

This is not for a specific date or location.

San Francisco Fire Department NERT is collecting information from NERT Graduates to help us plan for the new year. By signing up here, you will receive priority notification about upcoming recertification opportunities. This is for any NERT graduate, regardless of when you graduated or whether your NERT certification has expired. Thank you so much for your commitment to NERT and for providing us with information about when you last trained, etc.

Sign Up For Training Classes

This is not for a specific date or location.

San Francisco Fire Department is collecting contact details from prospective students so we can let you know when classes are available. We will email you when classes become available. We plan on holding multiple trainings for new NERTs in 2022 and the information you provide will help us plan. Thank you!

https://www.eventbrite.com/e/never-taken-nert-before-let-us-know-you-are-interested-in-2022-trainings-tickets-125825993935?aff=odcleoeventsincollection

***SFFD DOT** is the Fire Department Division of Training. All participants walking, biking or driving **enter through the driveway gate on 19th St.** between Folsom and Shotwell. Parking is allowed along the back toward the cinderblock wall.

Visit ***www.sfgov.org/sffdnert*** to learn more about the training, other locations, and register on line. Upcoming Special NERT Events.

San Francisco Police Department: Auxiliary Law Enforcement Response Team (ALERT)

The Auxiliary Law Enforcement Response Team (ALERT) is a citizen disaster preparedness program designed. The ALERT program is for volunteers 16 years of age or older, who live, work, or attend high school in San Francisco.

Graduates of the San Francisco Police Activities League (P.A.L) Law Enforcement Cadet Academy are also eligible to join.

ALERT volunteers will no longer need to complete the Fire Department's Neighborhood Emergency Response Team (NERT) (www.sfgov.org/sfnert) training and then graduate into two 8 hour Police Department course specifically designed for ALERT team members.

ALERT members will work closely with full-time and/or Reserve Police Officers in the event they are deployed after a disaster. The Basic ALERT volunteer will have no law enforcement powers other than those available to all citizens.

SFPD ALERT Training (New Members)

The next SFPD ALERT training class has been scheduled for: TBD

* Class date indicated are only for new members

IMPORTANT- All participants must complete the background interview process in order to be eligible to attend the ALERT training class.

Eligible ALERT participants may register for a training class by contacting the ALERT Program Coordinator, Marina at sfpdalert@sfgov.org, or by telephone at 415-401-4615.

SFPD ALERT Practice/Training Drill

All active/trained ALERT members are asked to join us for our next training drill, via scheduled for on

TBD

For more information on the San Francisco Police Department ALERT Program, email us at sfpdalert@sfgov.org, or call Lt. Marina Chacon (SFPD Ret.), SFPD ALERT Program Coordinator, at (415) 401-4615.

For additional information on the web please refer to:
https://sfgov.org/policecommission/alert

Tech Article

BERKELEY LAB
Bringing Science Solutions to the World

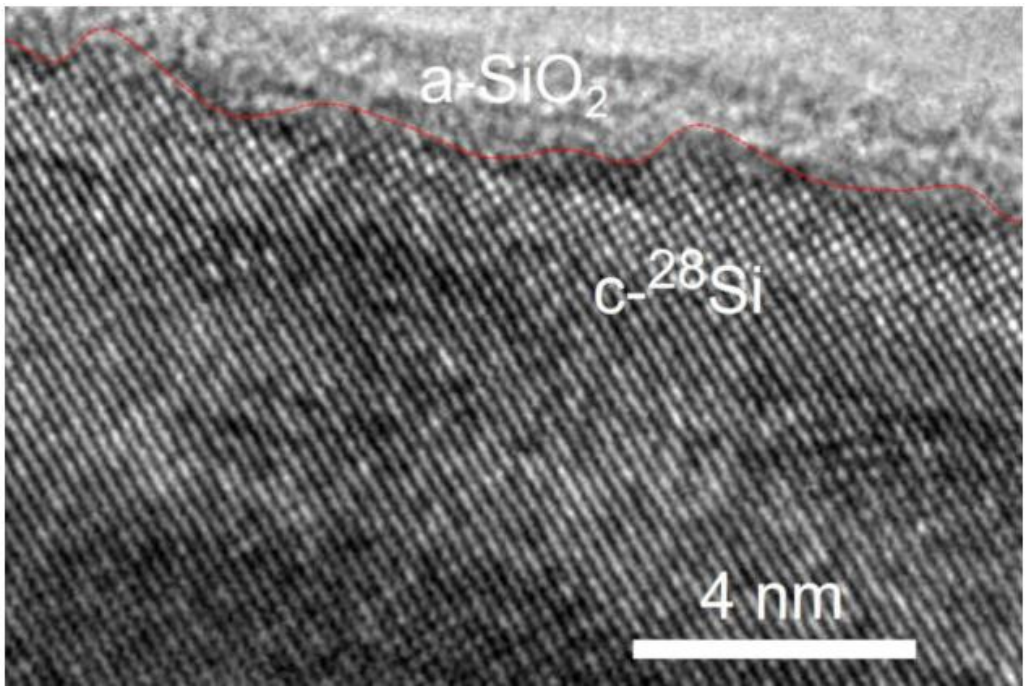
News Center

New Silicon Nanowires Can Really Take the Heat

A game-changing discovery could speed up computer processors simply by conducting more heat

News Release Theresa Duque (510) 495-2418 • May 17, 2022

https://newscenter.lbl.gov/2022/05/17/silicon-nanowires-take-the-heat/



Transmission electron microscopy image showing a silicon-28 nanowire coated with silicon dioxide (SiO_2). (Credit: Matthew R. Jones and Muhua Sun/Rice University)

Scientists have demonstrated a new material that conducts heat 150% more efficiently than conventional materials used in advanced chip technologies.

The device – an ultrathin silicon nanowire – could enable smaller, faster microelectronics with a heat-transfer-efficiency that surpasses current technologies. Electronic devices powered by microchips that efficiently dissipate heat would in turn consume less energy – an improvement that could help mitigate the consumption of energy produced by burning carbon-rich fossil fuels that have contributed to global warming.

“By overcoming silicon’s natural limitations in its capacity to conduct heat, our discovery tackles a hurdle in microchip engineering,” said Junqiao Wu, the scientist who led the Physical Review Letters study reporting the new device. Wu is a faculty scientist in the Materials Sciences Division and professor of materials science and engineering at UC Berkeley.

Heat’s slow flow through silicon

Our electronics are relatively affordable because silicon – the material of choice for computer chips – is cheap and abundant. But although silicon is a good conductor of electricity, it is not a good conductor of heat when it is reduced to very small sizes – and when it comes to fast computing, that presents a big problem for tiny microchips.

Artist’s rendering of a microchip. (Credit: dmitriy-orlovskiy/Shutterstock)

Within each microchip resides tens of billions of silicon transistors that direct the flow of electrons in and out of memory cells, encoding bits of data as ones and zeroes, the binary language of computers. Electrical currents run between these hard-working transistors, and these currents inevitably generate heat.

Heat naturally flows from a hot object to a cool object. But heat flow gets tricky in silicon.

In its natural form, silicon is made up of three different isotopes – forms of a chemical element containing an equal number of protons but different number of neutrons (hence different mass) in their nuclei.

About 92% of silicon consists of the isotope silicon-28, which has 14 protons and 14 neutrons; around 5% is silicon-29, weighing in at 14 protons and 15 neutrons; and just 3% is silicon-30, a relative heavyweight with 14 protons and 16 neutrons, explained co-author Joel Ager, who holds titles of senior scientist in Berkeley Lab’s Materials

Sciences Division and adjunct professor of materials science and engineering at UC Berkeley.

From left: Junqiao Wu and Joel Ager.
(Credit: Thor Swift/Berkeley Lab; photo of Joel Ager courtesy of UC Berkeley)

As phonons, the waves of atomic vibration that carry heat, wind their way through silicon's crystalline structure, their direction changes when they bump into silicon-29 or silicon-30, whose different atomic masses "confuse" the phonons, slowing them down.

"The phonons eventually get the idea and find their way to the cold end to cool the silicon material," but this indirect path allows waste heat to build up, which in turn slows your computer down, too, Ager said.

A big step toward faster, denser microelectronics

For many decades, researchers theorized that chips made of pure silicon-28 would overcome silicon's thermal conductivity limit, and therefore improve the processing speeds of smaller, denser microelectronics.

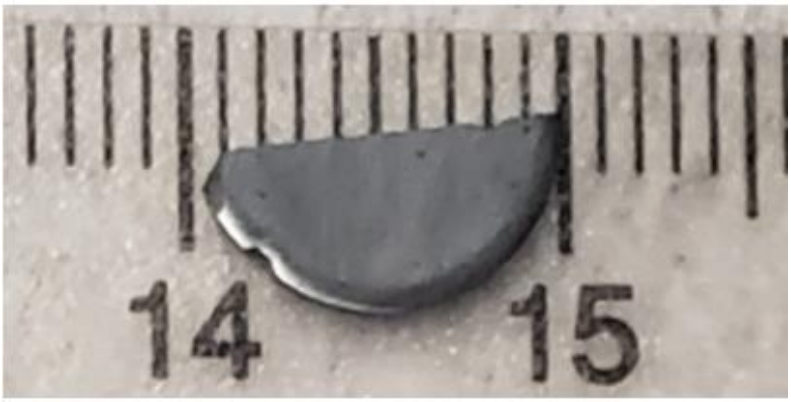
But purifying silicon down to a single isotope requires intense levels of energy which few facilities can supply – and even fewer specialize in manufacturing market-ready isotopes, Ager said.

Fortunately, an international project from the early 2000s enabled Ager and leading semiconductor materials expert Eugene Haller to procure silicon tetrafluoride gas – the

starting material for isotopically purified silicon – from a former Soviet-era isotope manufacturing plant. (Haller founded Berkeley Lab's DOE-funded Electronic Materials Program in 1984, and was a senior faculty scientist in Berkeley Lab's Materials Sciences Division and a professor of materials science and mineral engineering at UC Berkeley. He died in 2018.)

This led to a series of pioneering experiments, including a 2006 study published in Nature, whereby Ager and Haller fashioned silicon-28 into single crystals, which they used to demonstrate quantum memory storing information as quantum bits or qubits, units of data stored simultaneously as a one and a zero in an electron's spin.

Subsequently, semiconducting thin films and single crystals made with Ager's and Haller's silicon isotope material were shown to have a 10% higher thermal conductivity than natural silicon – an improvement, but from the computer industry's point of view, probably not enough to justify spending a thousand times more money to build a computer from isotopically pure silicon, Ager said
.



Optical microscopy image of a 99.92% silicon-28 crystal. Berkeley Lab scientist Junqiao Wu and his team used the 1 millimeter crystal to produce nanowires with a diameter of just 90 nanometers (billionths of a meter). (Credit: Junqiao Wu/Berkeley Lab)

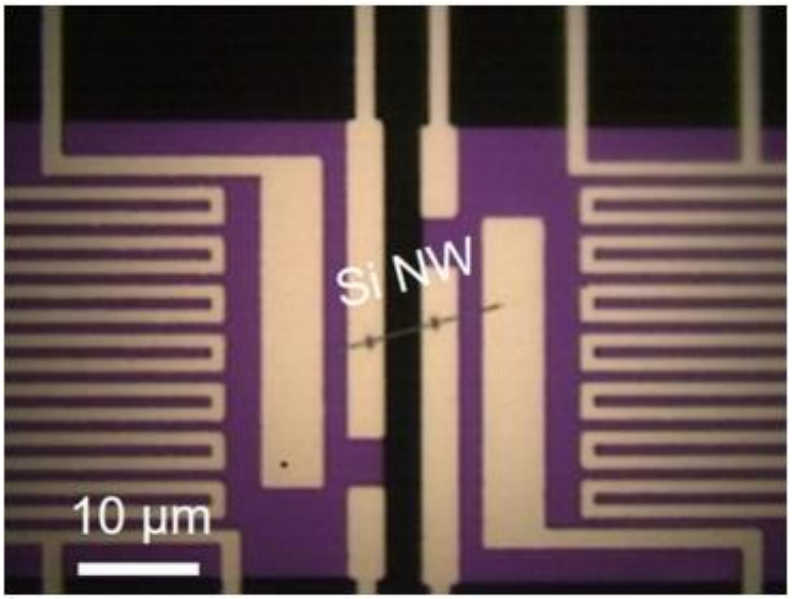
But Ager knew that the silicon isotope materials were of scientific importance beyond quantum computing. So he kept what remained in a safe place at Berkeley Lab, just in case other scientists might need it, because few people have the resources to make or even purchase isotopically pure silicon, he reasoned.

A path toward cooler tech with silicon-28

About three years ago, Prof. Junqiao Wu and his graduate student Penghong Ci were trying to come up with new ways to improve the heat transfer rate in silicon chips.

One strategy to make more efficient transistors involves using a type of nanowire called a Gate-All-Around Field Effect Transistor. In these devices, silicon nanowires are stacked to conduct electricity, and heat is generated simultaneously, Wu explained. "And if the heat generated is not extracted out quickly, the device would stop working, akin to a fire alarm blaring in a tall building without an evacuation map," he said.

But heat transport is even worse in silicon nanowires, because their rough surfaces – scars from chemical processing – scatter or "confuse" the phonons even more, he explained.



Optical microscopy image of a microdevice consisting of two suspended pads bridged by a silicon nanowire. (Credit: Junqiao Wu/Berkeley Lab)

"And then one day we wondered, 'What would happen if we made a nanowire from isotopically pure silicon-28?'" Wu said.

Silicon isotopes are not something one can easily buy on the open market, and word had it that Ager still had some silicon isotope crystals in storage at Berkeley Lab – not a lot, but still enough to share "if someone has a great idea about how to use it," Ager said. "

And Prof.Junqiao Wu's new study was such a case."

A surprising big reveal with nano tests

"We're really fortunate that Joel happened to have the isotopically enriched silicon material ready to use for the study," Wu said.

Using Ager's silicon isotope materials, the Wu team tested the thermal conductivity in bulk 1-millimeter-size silicon-28 crystals versus natural silicon – and again, their experiment confirmed what Ager and his collaborators discovered years ago – that bulk silicon-28 conducts heat only 10% better than natural silicon.

Now for the nano test. Using a technique called electroless etching, Ci made natural silicon and silicon-28 nanowires just 90 nanometers (billionths of a meter) in diameter – about a thousand times thinner than a single strand of human hair.

To measure the thermal conductivity, Ci suspended each nanowire between two microheater pads outfitted with platinum electrodes and thermometers, and then applied

an electrical current to the electrode to generate heat on one pad that flows to the other pad via the nanowire.

“We expected to see only an incremental benefit – something like 20% – of using isotopically pure material for nanowire heat conduction,” Wu said.

But Ci’s measurements astonished them all. The Si-28 nanowires conducted heat not 10% or even 20%, but **150%** better than natural silicon nanowires with the same diameter and surface roughness.

This defied everything that they had expected to see, Wu said. A nanowire’s rough surface typically slows phonons down. So what was going on?

High-resolution TEM (transmission electron microscopy) images of the material captured by Matthew R. Jones and Muhua Sun at Rice University uncovered the first clue: a glass-like layer of silicon dioxide on the silicon-28 nanowire surface.

Computational simulation experiments at the University of Massachusetts Amherst led by Zlatan Aksamija, a leading expert on the thermal conductivity of nanowires, revealed that the absence of isotope “defects” – silicon-29 and silicon-30 – prevented phonons from escaping to the surface, where the silicon dioxide layer would drastically slow down the phonons. This in turn kept phonons on track along the direction of heat flow – and therefore less “confused” – inside the silicon-28 nanowire’s “core.” (Aksamija is currently an associate professor of materials science and engineering at the University of Utah.)

“This was really unexpected. To discover that two separate phonon-blocking mechanisms – the surface versus the isotopes, which were previously believed to be independent of each other – now work synergistically to our benefit in heat conduction is very surprising but also very gratifying,” Wu said.

“Junqiao and the team discovered a new physical phenomenon,” Ager said. “This is a real triumph for curiosity-driven science. It’s quite exciting.”

Wu said that the team next plans to take their discovery to the next step: by investigating how to “control, rather than merely measure, heat conduction in these materials.”

Researchers from Rice University; the University of Massachusetts-Amherst; Shenzhen University, and Tsinghua University participated in the study.

This work was supported by the DOE Office of Science.

###

Founded in 1931 on the belief that the biggest scientific challenges are best addressed by teams, Lawrence Berkeley National Laboratory and its scientists have been

recognized with 14 Nobel Prizes. Today, Berkeley Lab researchers develop sustainable energy and environmental solutions, create useful new materials, advance the frontiers of computing, and probe the mysteries of life, matter, and the universe. Scientists from around the world rely on the Lab's facilities for their own discovery science. Berkeley Lab is a multiprogram national laboratory, managed by the University of California for the U.S. Department of Energy's Office of Science.

DOE's Office of Science is the single largest supporter of basic research in the physical sciences in the United States, and is working to address some of the most pressing challenges of our time. For more information, please visit energy.gov/science.

A U.S. Department of Energy National Laboratory Managed by the University of California

CARC/SARES ARRL Field Day June 25, 2022 Summary
By Ed Fong – WB6IQN

After a two-year break; we finally were able to meet up for our Annual CARC/SARES ARRL Field Day this June 25, 2022. About 60 plus folks attended our ARRL Field Day event. The weather was just ideal. I don't believe it got above 75° F degrees. The Fairbrae Swim and Tennis Center gave us the facility for both Saturday and Sunday. We had a small team that set up antennas on Friday so everything was all set for Saturday and Sunday to make and record radio contacts.

Many, many thanks to Howard Louie - N6MNV for volunteering to be our official CARC photographer, taking well over 130 photos at the CARC/SARES ARRL Field Day Event.

We combined the CARC ARRL Field Day event with the SARES (Sunnyvale Amateur Radio Emergency Service) group. This year we tried something different. Instead of organizing a traditional ARRL Field Day barbeque, we had China Wok restaurant cater the food. This way, I didn't need to organize a cooking team and folks got more time to socialize.

The China Wok restaurant did not let us down with their wonderful catered Chinese food. The delicious food menu consisted of: coconut fried shrimp, orange chicken, mixed vegetables, eggplant (with tofu and potatoes), and fried rice. Many thanks to our attendees that generously donated plenty of great desserts to share with our fellow diners,

I was glad to see CARC President George Chong - W6BUR come all the way down from Oakland. Also Dennis Lee - AH6KD drove from El Cerrito. George won the HDTV and Dennis won the 3 GHz network analyzer. Talk about winning - I won the laptop computer. It is one of the newest HP 14-inch touch screen models. This is exactly what I needed. My daughter (Violet) absolutely loves it and said that her old laptop was 6 years old. She used her old laptop daily as a school teacher at Rosemary Elementary School. Her laptop keys were all worn out. I told her if I did not win the laptop raffle prize that I would purchase her a new replacement laptop. By winning the raffle laptop, I saved about four hundred dollars.

I also saw numerous folks go swimming but no tennis players.

Folks loved the facility and were surprise that Fairbrae only charged us $200 for the two day rental. What a bargain? We even had full privileges to the dining hall but due to COVID-19 it was just safer to have everything outside since the weather was just perfect.

The raffle ticket sales paid for everything. I thank all the attendees for that.

List of Winners:

- **Violet/Ed Fong:** HP Chromebook -14 inch display - 4GB RAM 32GM of eMMC
- **Mike Murry - KI6JDY:** Radioddity QB25 (same as the QYT 7900SD)
- **Ralph Kruger - KC6YDH:** Radio Shack - 25 AMP switcher for HF radios.
- **Thomas Leibold - KK6FPP:** Tiny SA - 100KHz - 960 MHz spectrum analyzer
- **Dennis Lee - AH6KD:** Nano VNA Network Analyzer - 50KHz - 3000
- **George Chong - W6BUR:** ATYME 32 inch HDTV
- **Dan McQueen - N0SV:** Baofeng UV5R x3, Tri band handie talkie
- **Erez Baron - N6LLK:** Baofeng UV5R, dual band handie talkie
- **Jordon Makower - WA2BRV:** Canon PowerShot SD870 Digital camera
- **Joy Robins - N6GO:** 2AH LiOn USB Backup pack
- **Andrew Nelson - KN6BUI:** Radioddity Emergency radio
- **Amanda Dang - KM6OJU:** Swiss Army Pocket Knife

Mike Murry - KI6JDY: Winner of Radioddity QB25 Quad Band Transceiver.

CARC President George Chong – W6BUR – Winner of 32” TV

Thomas Leibold - KK6FPP: Winner of Tiny SA - Spectrum Analyzer

Ed Fong – WB6IQN: Winner of HP Chome Book

Dennis Lee - AH6KD: Winner of Nano VNA Network Analyzer - 50KHz - 3000

Andrew Nelson - KN6BUI: Winner of Radioddity Emergency radio

Dan McQueen - N0SV: Winner of Baofeng UV5R x3, Tri band handie talkie

Erez Baron - N6LLK: Winner of Baofeng UV5R, dual band handie talkie

Jordon Makower - WA2BRV: Winner of the Canon PowerShot SD870 Digital camera

Natalie Wahl, on behalf of Joy Robins - N6GO picking up 2AH LiOn USB Backup pack

Ralph Kruger - KC6YDH: Winner of Radio Shack - 25 AMP switcher for HF radios

Amanda Dang - KM6OJU: Winner of the Swiss Army Pocket Knife

The adorable Miss Gig Trani, sister of Joshua Tran -KN6UAH

Clockwise left to right: Thomas Leibold, Cliff, and Thomas Daede, observing SDR radio

Left to right: George Chong – W6BUR, Ed Fong - WB6IQN, and Lloyd De Vaughns - KD6FJI

Left to right: Terry, Jordon Makower - WA2BRV, Joy and Gordon Girton - W6NW

Thomas Leibold - KK6FPP, Marvin Wahl (W6FUV), Natalie Wahl, and Amanda Dang

Ron Quan – KI6AZB

Left to right counter clockwise; Todd Erying, Ralph Krueger - KC6YDH, Roger Pease – KE6PPI, and Sharadon Fong

Gudrun Polak and Wolfgan Polak – AI6SL

Bob Lai - KM6QP, Gary Gin - KN6LV, CARC President George Chong – W6BUR

Left to right: Lily Tran, Joshua Tran KN6UAH, and Gigi Tran

Unnamed-1, Cindy Spencer (blue, KN6ANA), Joann Rieke (yellow, KN6AMZ) and Roger Pease (KE6PPI)

Two lovey children of attendees

Cliff, Wolfgan Polak – AI6SL and Ed Fong - – WB6IQN

Wolfgan Polak – AI6SL and Damian Kowalewski (N6OY)

Foreground left to right: Lily Tran, Joshua Tran KN6UAH, and Gigi Tran

Ed Fong – WB6IQN, making and logging HAM radio contacts

Sharadon Fong and Steve Bannett – KK6UCO

Cliff and Bob Lai - KM6QP

Folks loading up with food and also queuing up at the food table

Folks enjoying the desert potluck that attendees generously donated to make the event successful.

Left to right: Joshua Tran - KN6UAH, Lily Tran and Gigi Tran

Bob Lai – KM6QP and Roger Pease – KE6PPI

Rob Busse and Ed Fong - WB6IQN

One of several group photos of the attendees

CARC President George Chong – W6BUR, Bob Lai - KM6QP, Gary Gin - KN6LV, Ralph Kruger – KC6YDH

Natalie Wahl and Marvin Wahl (W6FUV),

Left to right clockwise: George Chong – W6BUR, Bob Lai – KM6QP, Ed Fong – WB6IQN, Gary Gin - KN6LV, Howard Louie – N6MNV, Ralph Kruger - KC6YDH, and Dennis Lee - AH6KD.

One of several group photos of the attendees

Left to right clockwise: Thomas Daede, Jordon Makower - WA2BRV, Todd Erying, and Dan McQueen - N0SV

Left to right: Andrew Nelson - KN6BUI and Rob Busse

I wish to thank all the attendees for supporting us at this year's CARC/SARES ARRL Field Day event. Your participation and generous deserts donations contributed greatly to the success of the event.

I am looking forward to your continuing participation at next year's CARC/SARES ARRL Field Day event.

Ed Fong - WB6IQN