

WESTSIDE SCIENCE CLUB AND CCI SOLAR FUELS

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OVERVIEW

From August 2012 to July 2014, CCI Solar Fuels developed an ISE program with Westside Science Club (WSSC), Wildwood High School, & LA Makerspace, focusing on:

- 1) providing hands-on inquiry-based learning experiences for under-resourced children aged 8–14 in the Venice neighborhood of Los Angeles;
- 2) chemistry and STEM topics related to CCI Solar Fuels; and
- 3) professional development for effective communication of science to the public.

This successful program model will be replicated with Kidspace Museum in Pasadena, CA.



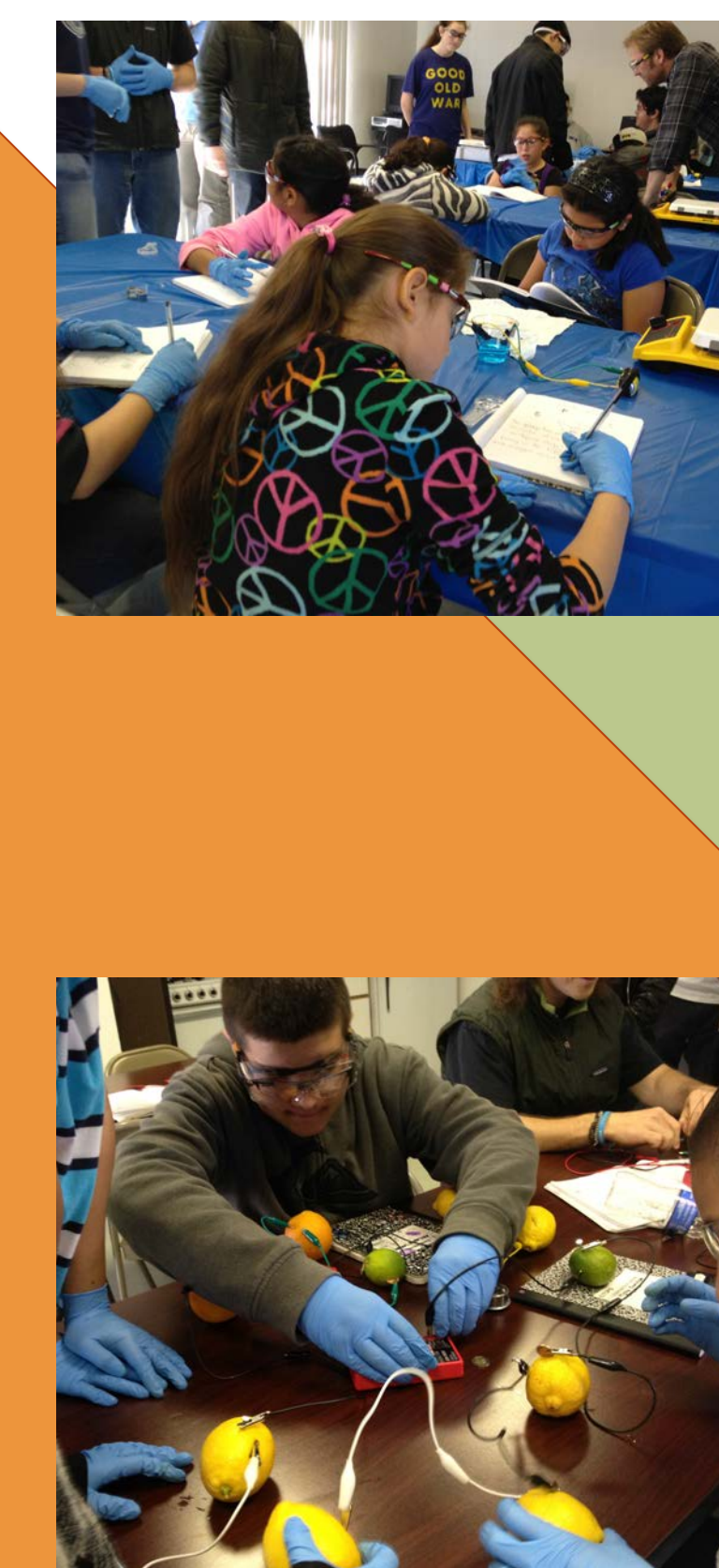
PLAYERS

WESTSIDE SCIENCE CLUB

CCI SOLAR

WILDWOOD SCHOOL

LA MAKERSPACE



- Started July 2008 by Ben Dickow
- Offers ISE for kids aged 8-14 in Venice, CA low-income housing communities
- CCI Solar Fuels partnership expanded opportunities and resources
- Typically 4-10 kids attend each session of a core group of 17

- NSF Center for Chemical Innovation focusing on solar fuels research
- Two pre-existing outreach projects SEAL and Juice from Juice targeting high school and college students
- Collaboration with WSSC targets a younger elementary-middle school audience
- First year had 2 postdocs as leaders, second year had a postdoc and 2 grad students

- High school students from Wildwood School in Santa Monica, CA acted as “near-peer” mentors for the WSSC kids
- First year cohort was 3 seniors + 1 junior with varying degrees of experience working with 3rd-8th grade students
- Second year cohort was 4 sophomores, all experienced in SEAL and interested in outreach
- Science teacher Levi Simons helped recruit students and develop club activities

- LAM is a community space with shared resources to explore, create, invent and learn through DIY and citizen science
- Established by Levi Simmons in 2012, housed in the Pio Pico branch of the Los Angeles Public Library
- Two of the initial projects were SEAL and Juice from Juice developed by CCI Solar Fuels

PROGRAM COMPONENTS

CLUB SESSIONS

LESSON DEVELOPMENT

FIELD TRIPS

PROFESSIONAL DEVELOPMENT

- 2 hour sessions held on alternate Saturdays from 10am-12pm in community room of a low-income housing unit
- Attended by up to 17 WSSC kids, Ben Dickow, 3-4 Wildwood high-school mentors, Levi Simmons, and 2-3 researchers and outreach professionals from Caltech
- Involved hands-on activities, discussions, and social interaction between adults and kids
- While attendance was not mandatory, a core group attended regularly resulting in long-term connections between program participants

- Activities were largely drawn from chemistry concepts for high school and university students, modified for the younger audience
- Year 1 – 15 standalone sessions about solar energy, color spectrum, dyes, semi-conductors, etc. used to demonstrate core principles behind solar energy and fuels
- Year 2 - broadened to more general STEM concepts lasting 3-4 sessions to explore their curiosity on projects ranging from biopolymers to batteries
- Ideas drawn from DIY activities in ISE and 'maker' movement

- Caltech: introduced WSSC kids to a top-tier university, and gave access to specialized equipment and materials
- USC: tour of the Loker Hydrocarbon Research Institute and exposure to cutting-edge methanol fuel cell technology
- ReDiscover Center: this makerspace gave unlimited, free materials and resources to build robots
- Santa Monica Aquarium: learnt about CO₂ ocean acidification and its effect on marine life
- Shell Hydrogen Filling Station: introduced the concept of hydrogen cars, and future transportation

- Workshops offered at Caltech and CCI Solar Fuels annual meeting,
- Offered opportunities for CCI Solar Fuels scientists about science communication, ISE, and STEM education
- Facilitated by Ben Dickow, Kim Burtnyk
- Caltech postdoctoral associate Shu Hu spoke about his research and ISE experiences at Wildwood School science night

SUCCESS MATRIX

	Category	Status
Overarching goals	Establish strong partnership between WSSC, CCI Solar Fuels, and Wildwood	✓
	Develop and deliver outreach activities for pre-high school audiences	✓
	Build a collaborative “makerspace”	✓
	Juice from Juice	✓
Tasks	Field trips	✓
	Build cheap opensource potentiostat for “makerspace” and ISE	✓
	Distribute electrochemistry tools to hobby science and engineering communities	✓
	Develop peer mentoring skills of HS students	✓
Skill Development	Enhance public communication skills of CCI scientists	✓

CHALLENGES

- Evaluation was difficult due to small size of the club, variable attendance, turnover in mentors from Caltech and Wildwood, and low response rate
- Meshing schedules and operational styles from three partners needed time adjustment

EVALUATION

- WSSC kids retained knowledge of solar fuels technology and maintained a love of science
- HS student mentors reported a valuable experience volunteering
- CCI scientists gained experience communicating to non-technical audiences & developed teaching skills



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Session #	Completed	Volunteers	Power (W-hr)
Session 1	0	0.9	0
Session 2	11.2	0.14	15.4
Session 3	56	0.20	16.9
Session 4	0.8	0.30	
Session 5	7.9		6.9
Session 6	5	0.128	0.27
Session 7	15	0.100	3.20
Session 8	0.2	0.30	1.20
			15

