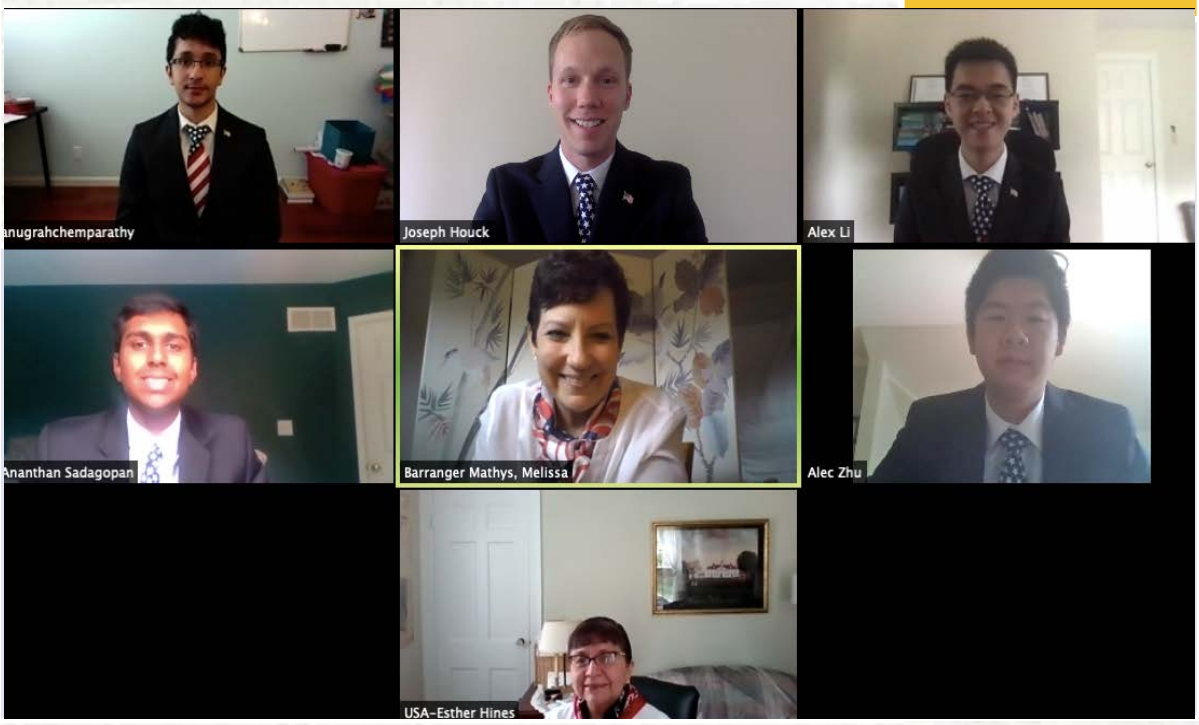
ACS USNCO
U.S. National Chemistry Olympiad

United States National Chemistry Olympiad

37th Summary Report

Alex Li from Team USA wins Top Gold Medal at the 2020 IChO in Turkey!

2020



U.S. NATIONAL CHEMISTRY OLYMPIAD

37th SUMMARY REPORT

2020

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2020 CHEMISTRY OLYMPIAD COMPETITION

The 52nd International Chemistry Olympiad (IChO) was held remotely and organized by Turkey July 23-30, 2020 and gathered 231 students from 60 countries that participated in the competition. The USA Team earned four gold medals

The American Chemical Society (ACS), and other donors supported the participation of the U.S. Alpha Nu team. **Alex Li** from Lexington High School, MA (Northeastern Local Section) won the Top Gold medal, placing first in the overall ranking of all students. **Alec Zhu** also from Lexington High School, MA (Northeastern LS), **Ananthan Sadagopan** from Westborough High School, MA (Central Massachusetts Local Section), and **Anugrah Chemparathy** of Dougherty Valley High School, CA (California Local Section), all earned gold medals placing 8th, 12th and 24th respectively.

This year 160 Local Sections registered for the competition and planned their local competitions. A national shut-down caused by the COVID-19 pandemic forced all schools to close and prevented many sections from carrying out their plans. The USNCO Subcommittee issued a statement on March 16, 2020 - regarding the administration of USNCO in the COVID-19 pandemic, informing Local Sections that the program would continue virtually with the omission of the laboratory exercises. Ninety Local Sections nominated their students for the national exam using printed exams that were administered before the shut-down and teacher recommendations. The USNCO national office organized a proctored digital local exam that allowed 50 additional Local Sections to participate. A total of 105 Local Sections nominated the students to sit for the digital national exam. 778 students took Part I of the national exam: with sixty multiple-choice questions on April 25 and 26, 2020. Part II of the exam consisting of eight free response problems, was administered virtually to top 150 students on May 3, 2020. Both parts of the national exam were administered by the USNCO national office and proctored by USNCO coordinators, mentors and ACS Education Division staff.

Twenty students who excelled on the national examination participated in a virtual USNCO study camp May 31-June 12, 2020 administered by the ACS. Students received training in various major areas of chemistry by faculty of the University of Maryland College Park, Department of Chemistry and Biochemistry, and from mentors **Melissa Barranger-Mathys** (chemistry professor, Ursuline College, OH), Joseph Houck (chemistry professor, Penn State University, PA), and Esther Hines (chemistry teacher, Billerica Memorial High School, MA). Peer mentor **Harrison Wang** (chemistry student, MIT, MA) assisted the mentors in training the students. This year all lectures, problem solving sessions and office hours as well as social activities were held virtually. Students participated in guest lectures given by: Dr. John Warner (Beyond Benign, MA), Dr. Clare Muhoro (Towson University, MD), Dr. Chungsheng Wong (University of Maryland College Park, MD), Dr. Darryl Boyd (US Naval Research Lab, Washington DC), Dr. Angela Zhou (CAS, OH), Dr. Ming Zheng (NIST, DC), Dr. Chris Jarzynski (University of Maryland College Park, MD). Dr. Luis Echegoyen, the 2020 ACS President was a keynote speaker at the virtual banquet for the students and invited guests. At the conclusion of the camp, the members of the U.S. team and two alternates were selected. The 2020 alternates were: Nicholas Tsao from St. Mark's School of Texas, TX (Dallas Fort Worth Local Section) and Michael Han of Dougherty Valley High School, CA (California Local Section).

The 52nd IChO was organized virtually and hosted from Istanbul, Turkey, between July 23 and July 30, 2020. Three students from Massachusetts took the exam at Old Lincoln School in Brookline, MA proctored by Mr. Steve Lantos, chemistry teacher from Brookline HS, MA and former USNCO mentor. Mr. Ethan Schnell, chemistry teacher from Dougherty Valley HS, San Ramon, CA hosted one student in his high school. Following the Turkish IChO organizers' instructions, students took the exam simultaneously on both US coasts. Exam translation, grading and arbitration was done virtually by the USNCO 2020 mentor team. Team USA students, metors and staff watched the virtual closing ceremony on July 30th when the results of the 52nd IChO were announced.

In 2020 new programs were introduced to help local sections promote the program and help students prepare for the USNCO.

The USNCO 2020 Recruitment Grants Program were introduced, with the goal to increase the reach of the USNCO to additional schools, students, and regions that may not have participated previously. From the 22 applications that were submitted, the following 13 Local sections were awarded up to $500 grants: Central Arkansas LS, Dayton LS, Eastern New York LS, Iowa LS, Kanawha Valley LS, LaCrosse-Winona LS, Northeastern LS, Northeastern Ohio LS, Rock River LS, San Antonio LS, Snake River LS, South Texas LS and St. Joseph Valley LS.

USNCO Coaching program began in October to help students improve their chemistry skills and become more competitive for the U.S. National Chemistry Olympiad. Students who were female, African-American, Hispanic, Native American, Pacific Islanders, or from other groups not currently well represented among National Exam nominees were particularly encouraged. From the 436 students who were nominated by their high schools teachers, 95 students were selected to take part in this program. Coaching sessions were organized monthly by Zoom, and coordinated by the ACS staff. Twenty coaches were recruited among high school teachers. The sessions included a 30 minute introduction on one of the ten topics that are covered by the USNCO exams.

USNCO program organized a series of webinars targeted to coordinators, teachers, and students. "Serving as a USNCO Coordinator" webinar was presented by Dr. Heather Abbot-Lyon, the USNCO coordinator from ACS Georgia Local Section, "How to Recruit Students for the USNCO" was presented by two coordinators: Craig McClure from Philadelphia LS and Dennis Merat from Memphis LS, "How to Help Students Prepare for USNCO" was presented by two chemistry teachers: Ethan Schnell from Dougherty Valley HS and Steve Lantos from Brookline HS, MA.

The American Chemical Society views the USNCO program as an investment in the future of young chemists in this country. The goals of the program are to:

- *stimulate young people to achieve excellence in chemistry;*
- *recognize outstanding chemistry students and, by doing so, encourage additional learning at a formative time in their intellectual development;*
- *recognize the excellent achievement of the teachers of these students and the importance of the school environment in which they learn;*

- *promote contact between ACS local sections and area schools and foster the interest and influence of professional chemists in the teaching of chemistry;*

- *challenge the chemical knowledge and skills of young students in an international arena; and,*

- *foster cross-cultural experiences and acquaint students with similarities and differences between themselves and their counterparts in other nations.*

Since 1984, the USNCO program has been sponsored by the Donald F. and Mildred Topp Othmer Chemistry Olympiad Endowment.

The following corporations and donors supported the program through financial support and in-kind donations:

- **John Wiley & Sons**
  Biochemistry, Organic textbooks

- **Macmillan Learning**
  Analytical chemistry textbooks

- **Pearson Education Company**
  Physical chemistry textbooks

- **Texas Instruments Inc.**
  Scientific calculators

- **Individual private donors**

The ACS USNCO staff appreciates the dedication, enthusiasm, and contribution of time given by:

- The 2020 members of the USNCO Subcommittee of the Society Committee on Education, which provided policy direction for this program,

- The members of the USNCO examinations task forces, the grading team, and the mentor selection task force,

- The faculty of the Department of Chemistry and Biochemistry of UMD College Park, and

- The mentors and peer mentor who taught and guided the 2020 Alpha Nu Team.

Thank you!

PARTICIPATING ACS LOCAL SECTIONS

Local Section (YP***)	Coordinator
1. Akron (26)	Carol Kercher
2. *Alabama (29)	J. Michael Wyss
3. *Alaska (8)	Toshia Wrenn
4. Ames (27)	Terry Kruse
5. Auburn (9)	Catherine Situma
6. Baton Rouge (36)	Daniel Varnado
7. *Binghamton (34)	Alexsandra Silva
8. Brazosport (9)	Yifan Dong
9. California (37)	Eileen Nottoli
10. California Los Padres (22)	Stephen Contakes
11. Carolina-Piedmont (23)	Tim Champion
12. Central Arizona (33)	Richard Bauer
13. Central Arkansas (37)	Marian Douglas
14. Central Massachusetts (14)	Mathangi Krishnamurthy
15. Central New Mexico (35)	Jacqueline Veauthier
16. Central New York (35)	Neal Abrams
17. *Central North Carolina (23)	Rodney Bennett
18. *Central Pennsylvania (34)	Tod McPherson
19. Central Texas (35)	Diane Kneeland
20. Central Utah (28)	Sally Rocks
21. Central Wisconsin (29)	Dana Haagenson
22. Chattanooga (34)	Rebecca Stimson
23. Chemical Soc. of Wash. (37)	R.Cody/I. James
24. Chicago (37)	R. Kohnken/D. Crumrine
25. Cincinnati (36)	Jill Page
26. Cleveland (34)	Anne O'Connor
27. *Colorado (37)	Lisa Johnson
28. *Columbus (35)	Mary Wahba
29. Connecticut Valley (37)	Edward Fitzgerald
30. Dallas-Fort Worth (30)	Kathleen Holley
31. Dayton (34)	Weijie Lu
32. Delaware (36)	Glenn Hartman
33. Detroit (36)	Mark DeCamp
34. East Central Illinois (6)	Rachel Farmer
35. *East Tennessee (31)	Al Hazari
36. *East Texas (27)	Greg Hogan
37. Eastern New York (35)	Eric Davenport
38. *Eastern North Carolina (29)	Stephen Gabriel
39. **Erie (35)	Christine Saber
40. Florida (30)	Stephanie Dillon
41. Georgia (31)	Heather Abbott-Lyon
42. Greater Houston (36)	Jerry Yang
43. *Green Mountain (22)	Marie Agan
44. Hampton Roads (36)	S. Black/K. Simmons
45. *Hawaii (36)	Pamela Fujinaka
46. *Hong Kong Int. Chapter (10)	David Lee Phillips
47. Huron Valley (27)	Larry Kolopajlo
48. *Idaho (35)	Rene Rodriguez
49. *Illinois-Heartland (31)	Dean Campbell
50. *Indiana Kentucky Border (31)	T. Thananatthanachon
51. Indiana (37)	Robert Pribush
52. **Iowa (31)	Shuvendu Das
53. Jacksonville (35)	Michael Lufaso
54. Joliet (35)	Chris Condeiu
55. Kanawha Valley (25)	Michael Fultz
56. Kansas City (36)	Innocent Pumure
57. Kansas State University (15)	Peter Sues
58. *LaCrosse Winona (20)	Basudeb Bhattacharyya
59. Lehigh Valley (33)	Gail Marsella
60. Lexington (13)	Meghan Knapp
61. Louisville (23)	J. Tatera/ K. Muller
62. *Maine (33)	James Killarney
63. Malaysia Int. Chapter (1)	Mohd Bakri Bakar
64. *Mark Twain (32)	Scott Luaders
65. Maryland (32)	Beatrice Salazar
66. Memphis (35)	Dennis Merat
67. *Michigan State University (35)	Virginia Cangelosi
68. *Mid-Hudson (36)	Lynn Maelia
69. Middle Georgia (3)	Alan Davis
70. Midland (35)	Michael Tulchinsky
71. Milwaukee (34)	Scott Barry
72. Minnesota (37)	Roberta Naujok
73. *Mississippi (26)	Reid Bishop
74. *MO-KAN-OK (20)	Dilip Paul
75. *Mobile (36)	Jessica Owens
76. Mojave Desert (11)	Tahira Mohammed
77. *Montana (36)	Carol Pleninger
78. Nashville (33)	Amanda Carroll
79. *Nebraska (7)	Christopher Morton
80. New Haven (34)	Olivier Nicaise
81. New York (37)	Sally Mitchell
82. North Alabama (34)	Bernhard Vogler
83. North Carolina (34)	Michael Bruno
84. North Jersey (37)	Steven Chen
85. Northeast Georgia (7)	Maurice Snook
86. *Northeast Tennessee (30)	Joseph Jernigan
87. *Northeast Wisconsin (36)	Andrew Schweitzer
88. Northeastern (37)	Steve Lantos
89. *Northeastern Indiana (32)	Vicki Moravec
90. Northeastern Ohio (18)	Christopher Kolp
91. Northern New York (14)	Jim Burdick
92. Northern Oklahoma (35)	Keith Lawson
93. Northern West Virginia (34)	Harry Finklea
94. Oklahoma (37)	Reza Latifi
95. Ole Miss (19)	Jason Ritchie
96. Omaha (13)	Edmund Tisko
97. Orange County (36)	Brent Shenton
98. *Oregon (20)	Richard Nafshun
99. Orlando (28)	Mary Roslonowski
100. *Penn-Ohio Border (35)	Michael Serra
101. *Pensacola (36)	Tanay Kesharwani
102. Permian Basin (9)	Pat Kesavan
103. Philadelphia (36)	Craig McClure
104. *Pittsburgh (37)	Ericka Huston
105. Portland (35)	Armando Heberlin
106. Princeton (25)	Danielle Jacobs
107. *Puerto Rico (29)	Sara Delgado Rivera
108. *Puget Sound (29)	J. Mayer/C. Bhat
109. Purdue (13)	Beatriz Cisneros
110. *Rhode Island (25)	Elaine Magyar
111. Rio Grande Valley (17)	Erik Yukl
112. Rochester (34)	Alexey Ignatchenko
113. *Rock River (37)	Matthew Bork
114. Sabine-Neches (20)	Lloyd Crosby
115. Sacramento (30)	Slava Bekker
116. *Salt Lake (37)	Michelle Paustenbaugh
117. San Antonio (35)	E. Robert Fanick
118. San Diego (36)	Joan Shellinger
119. San Gorgonio (36)	Dennis Pederson
120. San Joaquin Valley (9)	Kristi Closser
121. Savannah River (35)	Monty Fetterolf
122. Shanghai Int. Chapter (7)	Xuefeng Jiang

PARTICIPATING ACS LOCAL SECTIONS

Local Section (YP***)	Coordinator
123. Sierra Nevada (18)	Sean Casey
124. Silicon Valley (34)	Sally Peters
125. Snake River (12)	Marian DeWane
126. South Carolina (33)	Amy Rogers
127. South Florida (28)	Venkatesh Shanbhag
128. South Korea Int. Chapter (4)	Chang Gi Cho
129. *South Plains (20)	Subha Pratihar
130. South Texas (27)	Ludivina Avila
131. Southeastern Pennsylvania (36)	Todd Trout
132. *Southern Arizona (18)	Iman Daryaei
133. Southern California (37)	Gerald Delker
134. Southern Illinois (27)	Gary Kinsel
135. Southern Indiana (5)	Jill Robinson
136. *Southern Nevada (35)	Mark Garner
137. *Southwest Georgia (34)	Alexandrina Focsan
138. St. Joseph Valley (35)	Susan DelValle
139. St. Louis (37)	Harold Harris
140. *Susquehanna Valley (34)	Patrick Martino
141. Tampa Bay (15)	Eric Ballard
142. Texas A & M (12)	Stephanie McCartney
143. Toledo (25)	Somnath Dutta
144. Trenton (36)	Danielle Jacobs
145. **Tulsa (33)	Patrick Idwasi
146. **University of Arkansas (12)	Julie Stenken
147. Upper Peninsula (21)	Momoko Tajiri
148. **Virginia Blue Ridge (18)	Kimberly Lane
149. *Virginia (36)	Ann Sullivan
150. *Wabash Valley (33)	Teresa Tarbuck
151. *Wakarusa Valley (10)	Lisa Sharpe Elles
152. Washington-Idaho Border (9)	Kristopher Waynant
153. *Western Carolinas (32)	George Heard
154. Western Connecticut (36)	Amy Broderick
155. Western Maryland (30)	James Stickler
156. Western New York (35)	Mariusz Kozik
157. *Wichita (27)	Norman Schmidt
158. *Wichita Falls-Duncan (31)	Jianguo Shao
159. Wisconsin (16)	Matt Bowman
160. *Wooster(26)	Steven Boyer

* Participated in the program but was unable to host exams
**Participated in the local section competition but not the National Exam
*** YP-Number of years participating in the USNCO

USNCO STUDY CAMP PARTICIPANTS

STUDENT/GRAD. YEAR	SCHOOL/TEACHER	LS/COORDINATOR
Ridings Bald 2020	The Westminster Schools, GA Juliet Allan	Georgia Heather Abbott-Lyon
Anugrah Chemparathy 2020	Dougherty Valley High School, CA Ethan Schnell	California Eileen Nottoli
Derek Chien 2021	Davidson Academy, NV Elizabeth Walenta	Sierra Nevada Sean Casey
Alex Dang 2022	Arcadia High School, CA Cherryl Mynster	Southern California Gerald Delker
Robbie Ge 2023	Carmel High School, IN Jennifer Drudge	Indiana Robert Pribush
Michael Han 2020	Dougherty Valley High School, CA Ethan Schnell	California Eileen Nottoli
Alex Li 2021	Lexington High School, MA Laura Ferrari	Northeastern Steve Lantos
Andrew Ni 2020	Amherst Regional High School, CT Daiheng Ni	Connecticut Valley Edward Fitzgerald
Nicholas Ouyang 2021	University High School, CA Nicholas Brighton	Orange County Brent Shenton
Ananthan Sadagopan 2021	Westborough High School, MA Michelle Wynn	Central Massachusetts Mathangi Krishnamurthy
Yannik Singh 2020	Carmel High School, IN Jennifer Drudge	Indiana Robert Pribush
Nathan Tang 2020	Bergen County Academies, NJ Doug Kim	North Jersey Steven Chen
Sachin Thaker 2021	Morgantown High School, WV Joseph Melia	Northern West Virginia Harry Finklea
Nicholas Tsao 2020	St. Mark's School of Texas, TX Kenneth Owens	Dallas Fort Worth Kathleen Holley
Phoenix Wu 2023	Seven Lakes High School, TX n/a	Greater Houston Jerry Yang
Iris Yan 2020	Carmel High School, IN Virginia Kundrat	Indiana Robert Pribush
Kaien Yang 2021	Thomas Jefferson HS for Science and Technology, VA Adam Smolinsky	Chemical Society of Washington Regina Cody
Qiyang Zhou 2021	PRISMS, NJ Steven Chen	Princeton Danielle Jacobs
Alec Zhu 2021	Lexington High School, MA Janice Compton	Northeastern Steve Lantos
Yitian Zhu 2021	Seven Lakes High School, TX Jennifer Notz	Greater Houston Jerry Yang

52nd INTERNATIONAL CHEMISTRY OLYMPIAD RESULTS

In the 52nd International Chemistry Olympiad 231students from 60 countries participated and were awarded 149 medals and 15 Honorable Mentions (HM)
26 students received gold, 50 students received silver, and 73 students received bronze medals

	COUNTRY (number of years of participation)	MEDALS
1.	Armenia (5)	1 silver, 1 bronze
2.	Australia (33)	1 silver, 3 bronze
3.	Austria (45)	2 silver, 2 bronze
4.	Azerbaijan (21)	1 silver, 1 bronze
5.	Belgium (40)	1 HM
6.	Brazil (21)	1 silver, 3 bronze
7.	Bulgaria (51)	1 silver, 3 bronze
8.	Canada (34)	3 bronze
9.	China (33)	3 gold, 1 silver
10.	Chinese Taipei (21)	2 gold, 2 silver
11.	Czech Republic (52)	1 gold, 2 silver, 1 bronze
12.	Denmark (40)	
13.	El Salvador (8)	2 bronze, 1 HM
14.	Estonia (27)	2 silver, 1 bronze
15.	Finland (43)	
16.	France (39)	3 HM
17.	Georgia (7)	
18.	Germany (30)	2 silver, 2 bronze
19.	Greece (25)	1 bronze, 2 HM
20.	Hungary (52)	1 silver, 3 bronze
21.	Iceland (19)	
22.	Indonesia (24)	2 silver, 2 bronze
23.	Iran (28)	1 gold, 2 silver, 1 bronze
24.	Ireland (23)	
25.	Israel (15)	1 gold, 2 silver, 1 bronze
26.	Japan (18)	4 silver
27.	Kazakhstan (23)	4 bronze
28.	Korea (29)	2 gold, 2 silver
29.	Kyrgyzstan (21)	1 silver, 2 bronze
30.	Latvia (30)	4 bronze
31.	Lithuania (19)	2 bronze, 2 HM
32.	Mexico (29)	2 bronze, 1 HM
33.	Montenegro (6)	
34.	Netherlands (41)	1 bronze
35.	Nigeria (8)	
36.	North Macedonia (8)	1 bronze, 1 HM
37.	Norway (39)	
38.	Pakistan (15)	
39.	Philippines (4)	1 silver, 3 bronze
40.	Poland (52)	1 silver, 3 bronze
41.	Portugal (17)	
42.	Russia (27)	1 gold, 3 silver
43.	Saudi Arabia (10)	4 bronze
44.	Serbia (9)	3 silver, 1 bronze
45.	Singapore (31)	3 gold, 1 silver
46.	Slovakia (26)	1 silver, 3 bronze
47.	Slovenia (29)	3 bronze
48.	Sri Lanka (1)	3 bronze, 1 HM
49.	Switzerland (34)	1 bronze, 1 HM
50.	Syria (11)	2 bronze, 1 HM
51.	Tajikistan (16)	2 bronze
52.	Thailand (31)	4 silver
53.	Turkey (28)	2 gold, 2 silver
54.	United Kingdom (38)	1 gold, 3 silver
55.	***USA (37)***	***4 gold***
56.	Uruguay (22)	
57.	Uzbekistan (8)	2 silver, 1 bronze, 1 HM
58.	Venezuela (20)	1 bronze
59.	Vietnam (25)	4 gold

Observing countries:

Afghanistan, Albania, Ecuador, Mali, Nepal, Oman, Paraguay, Trinidad and Tobago

USNCO NATIONAL EXAM STATISTICAL INFORMATION
(TOTAL STUDENTS – 778)

Gender			
Male	597	77%	
Female	180	23%	
Other	1	0%	
Responses	778	100%	100%
Ethnic Background			
African American	12	2%	
Asian	460	59%	
Hispanic	25	3%	
White	213	27%	
Native American	0	0%	
Pacific Islander	1	0%	
Prefer not to disclose	23	3%	
Other	44	6%	
Responses	778	100%	100%
Grade in School			
12th Grade	174	22%	
11th Grade	423	54%	
10th Grade	153	20%	
9th Grade	27	3%	
Other	0	0%	
Responses	778	100%	100%
Years of H.S. Chemistry			
1	235	30%	
2	483	62%	
3	52	7%	
4	6	1%	
5 or more	1	0%	
Responses	777	100%	100%
Average time per week spent doing experiments in HS Chemistry Lab			
Less than ½ hour	257	33%	
Between ½ and 1 hour	314	41%	
Between 1 and 2 hours	166	21%	
More than 2 hours	37	5%	
Responses	774	100%	99%
Intended College Major			
Biological Sciences/Pre-Medicine	266	23%	
Chemistry or other Chemical Science	345	29%	
Engineering/Mathematics/Physics	300	26%	
Other Science discipline	82	7%	
Other or undecided	178	15%	
Responses	1178	100%	n/a

As a result of participating in USNCO students (% responded):	**Strongly agree**	**Agree**	**Disagree**	**Strongly disagree**
Plan to study more chemistry	40%	52%	7%	1%
Plan to major in chemistry	16%	40%	41%	3%
Have more positive view about chemistry	40%	53%	6%	1%

USNCO STATISTICAL INFORMATION

	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994
Local Exam Local Sections	45	90	115	133	138	137	142	142	136	140	138
Natl. Exam Local Sections	45	90	115	133	138	137	142	142	136	138	138
Natl. Exam Nominees	209	500	600	650	706	689	719	684	638	940	900
Countries participating in IChO	21	22	22	26	26	26	28	31	33	38	41
Students participating in IChO	76	83	86	103	104	104	111	118	131	149	156

	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005
Local Exam Local Sections	131	136	142	147	145	143	142	146	135	**131**	134
Natl. Exam Local Sections	121	130	127	134	130	126	121	133	130	125	128
Natl. Exam Nominees	875	840	838	880	851	809	796	850	829	800	909
Countries participating in IChO	42	45	47	55	51	54	54	57	59	61	59
Students participating in IChO	163	170	184	185	199	216	210	225	232	234	225

	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
Local Exam Local Sections	133	139	127	129	133	135	141	141	143	144	142
Natl. Exam Local Sections	125	128	117	125	128	126	134	135	137	134	128
Natl. Exam Nominees	890	917	868	916	930	941	1034	1062	1011	1010	983
Countries participating in IChO	66	66	66	65	68	70	72	73	75	75	67
Students participating in IChO	254	256	257	250	267	273	283	291	291	290	264

USNCO STATISTICAL INFORMATION

	2017	2018	2019	2020							
Local Exam Local Sections	144	150	152	160 intended 110 organized							
Natl. Exam Local Sections	138	139	143	105							
Natl. Exam Nominees	982	1025	1017	778							
Countries participating in IChO	76	76	80	60							
Students participating in IChO	297	300	309	231							

IChO PARTICIPATING TEAMS RESULTS 1984—2020

1984—Frankfurt, West Germany—16th IChO

Name	School	Local Section	Medals	Ranking
Seth Brown	Taylor Allderdice H.S., Pittsburgh, PA	Pittsburgh	Silver	13 (of 76)
Keith Rickert	The Latin School of Chicago, IL	Chicago	Bronze	37
Aaron DiAntonio	Clayton H.S., MO	St. Louis	Bronze	50
Peter Capofreddi	Newton High H.S., MA	Northeastern	D. R.*	

1985—Bratislava, Czechoslovakia—17th IChO

Name	School	Local Section	Medals	Ranking
Keith Rickert	The Latin School of Chicago, IL	Chicago	Silver	12 (of 83)
David Maymudes	University H.S., Los Angeles, CA	Southern California	Silver	25
Glen Whitney	Medfield H.S., MA	Northeastern	Bronze	44
Eric Kelson	Bountiful H.S., UT	Salt Lake City	Bronze	54

1986—Leiden, Holland—18th IChO

Name	School	Local Section	Medals	Ranking
Keith Rickert	The Latin School of Chicago, IL	Chicago	Gold	3 (of 86)
David Maymudes	University H.S., Los Angeles, CA	Southern California	Silver	20
Howard Lee	Lowell H.S., San Francisco, CA	California	Bronze	49
Hedy Edmonds	Greenwich H.S., CT	Western Connecticut	D. R.*	

1987—Veszprem, Hungary—19th IChO

Name	School	Local Section	Medals	Ranking
Anthony West	Kempsville H.S., Virginia Beach, VA	Hampton Roads	Silver	23 (of 103)
Cecil Huang	Pequannock Townsh. H.S., Pompton Pl., NJ	North Jersey	Silver	34
Jeffrey Snyder	Amherst Central H.S., NY	Western New York	Bronze	48
Kevin Crellin	Highland H.S., Salt Lake City, UT	Salt Lake City	D. R.*	

1988—Helsinki, Finland—20th IChO

Name	School	Local Section	Medals	Ranking
David Cliffel	Plainfield H.S., IL	Joliet	Silver (tie)	15 (of 104)
Laurance Lee	Lowell H.S., San Francisco, CA	California	Silver (tie)	15
Brian Kantsiper	Spring Valley H.S., Columbia, SC	South Carolina	Silver	26
Kurt Huang	New Terier H.S., Winnetka, IL	Chicago	Bronze	43

1989—Halle, German Democratic Republic—21st IChO

Name	School	Local Section	Medals	Ranking
Raphael Lehrer	Highland Park H.S., NJ	North Jersey	Bronze	40 (of 104)
Jon Kleinberg	Iroquois Central School, Elma, NY	Western New York	Bronze	42
Michael Furlanetto	Cherry Hill East H.S., PA	Philadelphia	Bronze	64
Roger Moore	Thompson Valley H.S., Loveland, CO	Colorado	D. R.*	69

* D.R. Diploma of Recognition

IChO PARTICIPATING TEAMS RESULTS 1984—2020

1990—Paris, France—22nd IChO

Name	School	Local Section	Medals	Ranking
Wayne Whitney	Medfield H.S., MA	Northeastern	Gold	6 (of 111)
Marc Dionne	La Jolla H.S., CA	San Diego	Silver	30
Roger Moore	Thompson Valley H.S., Loveland, CO	Colorado	Silver	31
Steve Gubser	Cherry Creek H.S., Greenwood Village, CO	Colorado	Silver	32

1991—Lodz, Poland—23rd IChO

Name	School	Local Section	Medals	Ranking
Forrest Michael	Naperville Central H.S., IL	Chicago	Gold	12 (of 118)
Dean Chung	Mountain Lakes H.S., NJ	North Jersey	Silver	26
Ashley Reiter	NC School of Sci.& Math, Durham, NC	North Carolina	Bronze	39
Susan Kuhn	Girls Preparatory School, Chattanooga, TN	Chattanooga	Bronze	41

1992—Washington, DC/Pittsburgh, PA, USA—24th IChO

Name	School	Local Section	Medals	Ranking
Swaine Chen	O'Fallon Township H.S., IL	St. Louis	Gold	15 (of 131)
Logan McCarty	Amherst Central H.S., NY	Western New York	Silver	21
Jeffrey Chuang	Bellaire H.S., TX	Southeastern Texas	Silver	35
Christopher Herzog	Highland Park H.S., NJ	North Jersey	Bronze	44

1993—Perugia, Italy—25th IChO

Name	School	Local Section	Medals	Ranking
Chris Herzog	Highland Park H.S., NJ	North Jersey	Gold	5 (of 149)
Daniel Katz	Torrey Pines H.S., San Diego, CA	San Diego	Gold	14
David Hutz	Fox Chapel H.S., Pittsburgh, PA	Pittsburgh	Silver	27
Robert West	Oak Park H.S., Kansas City, MO	Kansas City	Silver	49

1994—Oslo, Norway—26th IChO

Name	School	Local Section	Medals	Ranking
Jessen Yu	T. Jefferson H.S. for S&T, Alexandria, VA	Washington, DC	Gold	12 (of 156)
Justin McCarty	Amherst Central H.S., NY	Western New York	Gold	19
Nicholas Loehr	Midlothian H.S., VA	Virginia	Silver	47
James Grimmelman	Horace Mann H.S., Riverdale, NY	New York	Bronze	59

1995—Beijing, China—27th IChO

Name	School	Local Section	Medals	Ranking
Jason Wong	T. Jefferson H.S. for S&T, Alexandria, VA	Washington, DC	Silver	43 (of 163)
Prashant Mishra	Detroit Country Day S., Beverly Hills, MI	Detroit	Silver	56
Elliot Waingold	Central York H.S., PA	Southeastern PA	Bronze	79
Michael Sawka, Jr.	Gunn H.S., Palo Alto, CA	Santa Clara Valley	Bronze	106

IChO PARTICIPATING TEAMS RESULTS 1984—2020

1996—Moscow, Russia—28th IChO

Name	School	Local Section	Medals	Ranking
Henry Fu	Brecksville-Broadview Hts. H.S., OH	Cleveland	Gold	8 (of 170)
Alex MeVay	Groton School, MA	Northeastern	Silver	39
Michael Sawka, Jr.	Gunn H.S., Palo Alto, CA	Santa Clara Valley	Silver	45
Jason Chen	Claremont H.S., CA	San Gorgonio	Bronze	63

1997—Montreal, Canada—29th IChO

Name	School	Local Section	Medals	Ranking
Jason Chen	Claremont H.S., CA	San Gorgonio	Gold	2 (of 184)
Jordan Krall	Harvard-Westlake S., N. Hollywood, CA	Southern California	Silver	38
Andrew Heckerling	Niles West H.S., Skokie, IL	Chicago	Silver	51
Ian Baker	The McCallie School, Chattanooga, TN	Chattanooga	Bronze	112

1998—Melbourne, Australia—30th IChO

Name	School	Local Section	Medals	Ranking
Thomas Snyder	Amherst Central H.S., NY	Western New York	Gold	2 (of 185)
Ian Baker	The McCallie School, Chattanooga, TN	Chattanooga	Gold	6
Alexander Ioannidis	Bel Air H.S., MD	Maryland	Silver	30
Wei Ho	New Berlin West H.S., WI	Milwaukee	Bronze	86

1999—Bangkok, Thailand—31st IChO

Name	School	Local Section	Medals	Ranking
Timothy Jones	NC School of Sci.& Math, Durham, NC	North Carolina	Top Gold	1 (of 196)
Alexander Ho	Niles West H.S., Skokie, IL	Chicago	Gold	9
Wei Ho	New Berlin West H.S., WI	Milwaukee	Gold	20
Lisa Carlivati	T.Jefferson H.S. for S&T, Alexandria, VA	Washington, DC	Silver	36

2000—Copenhagen, Denmark—32nd IChO

Name	School	Local Section	Medals	Ranking
David Kurtz	Skyline H.S., Idaho Falls, ID	Idaho	Top Gold	1 (of 216)
Charles Duan	Beverly Hills H.S., CA	Southern California	Gold	13
Luke McSpadden	OK School for Science & Math, Tulsa, OK	Oklahoma	Bronze	69
Albert Wang	Bellaire H.S., TX	Greater Houston	Bronze	74

2001—Mumbai, India—33rd IChO

Name	School	Local Section	Medals	Ranking
Sean Kedrowski	Baylor H.S., Chattanooga, TN	Chattanooga	Gold	7 (of 210)
Binghai Ling	Brighton H.S., Rochester, NY	Rochester	Gold	15
Albert Wang	Bellaire H.S., TX	Greater Houston	Silver	25
Collin Martin	OK School for Science & Math, Tulsa, OK	Oklahoma	Silver	27

IChO PARTICIPATING TEAMS RESULTS 1984—2020

2002—Groningen, The Netherlands—34th IChO

Name	School	Local Section	Medals	Ranking
Helen Shi	OK School for Science & Math, Tulsa, OK	Oklahoma	Gold	21 (of 225)
Daniel Cissell	Walnut Hill H.S., Cincinnati, OH	Cincinnati	Gold	25
Colin Whittaker	Wayland H.S., MA	Northeastern	Silver	36
Timothy Davenport	OK School for Science & Math, Tulsa, OK	Oklahoma	Bronze	90

2003—Athens, Greece—35th IChO

Name	School	Local Section	Medals	Ranking
Wei-Han Bobby Liu	Cookeville H.S., TN	Nashville	Silver	80 (of 233)
Eric Brown	The McCallie School, Chattanooga, TN	Chattanooga	Bronze	98
Frances Hocutt	Redondo Union H.S., Redondo Beach, CA	Southern California	Bronze	104
Benjamin Kaduk	Naperville North H.S., IL	Chicago	Bronze	100

2004—Kiel, Germany—36th IChO

Name	School	Local Section	Medals	Ranking
Eric Brown	The McCallie School, Chattanooga, TN	Chattanooga	Silver	56 (of 234)
John L. Kiappes Jr.	Memorial H.S., Houston, TX	Greater Houston	Silver	78
Emily Tsui	Montgomery Blair H.S., Silver Spring, MD	Washington, DC	Silver	66
Fan Zhang	Bergen County Academies, NJ	North Jersey	Silver	75

2005—Taipei, Taiwan—37th IChO

Name	School	Local Section	Medals	Ranking
Jacob Sanders	Acad. for the Adv. of S&T, Hackensack, NJ	North Jersey	Silver	48 (of 225)
Nicholas Sofroniew	Harvard-Westlake S., N. Hollywood, CA	Southern California	Silver	64
Allen Cheng	Arcadia H.S., CA	Southern California	Silver	72
Scott Rabin	Miami Palmetto H.S., FL	South Florida	Bronze	109

2006—Gyeongsan, Republic of Korea—38th IChO

Name	School	Local Section	Medals	Ranking
Michael Blaisse	Bishop McDevitt H.S., PA	Southeastern PA	Silver	55 (of 254)
Gregory Brockman	Red River H.S., ND	Red River Valley	Silver	65
Andrew Freddo	Manalapan H.S., NJ	Monmouth County	Silver	77
Alexander Zozula	East Brunswick H.S., NJ	North Jersey	Bronze	94

2007—Moscow, Russia—39th IChO

Name	School	Local Section	Medals	Ranking
Brian Lee	Aca. for the Adv. of S&T, Hackensack, NJ	North Jersey	Silver	40 (of 256)
Justin Koh	Stockdale H.S., CA	Southern California	Silver	43
Kenneth Brewer	Timpview H.S., UT	Central Utah	Silver	65
Sofia Izmailov	W. Windsor-Plainsboro H.S. South, NJ	Trenton	Bronze	152

IChO PARTICIPATING TEAMS RESULTS 1984—2020

2008—Budapest, Hungary—40th IChO

Name	School	Local Section	Medals	Ranking
Jonathan Lee	Harvard-Westlake H.S., N. Hollywood, CA	Southern California	Silver	70 (of 257)
Yuxin Xie	East Brunswick H.S., NJ	North Jersey	Bronze	89
Jenny Lu	Pomperaug H.S., Southbury, CT	New Haven	Bronze	132
Andrew Liu	Parkway Central H.S., Chesterfield, MO	St. Louis	Bronze	137

2009—Cambridge, England—41st IChO

Name	School	Local Section	Medals	Ranking
Yixiao Wang	Westfield H.S., NJ	North Jersey	Gold	25 (of 250)
Nathan Benjamin	W. H. Harrison H.S., West Lafayette, IN	Purdue	Silver	34
Brian Seifried	Chamblee H.S., GA	Georgia	Silver	37
Colin Lu	Vestal H.S., NY	Binghamton	Silver	59

2010—Tokyo, Japan—42nd IChO

Name	School	Local Section	Medals	Ranking
Colin Lu	Vestal H.S., NY	Binghamton	Gold	21 (of 267)
Alex Siegenfeld	Hopkins School, CT	New Haven	Gold	22
Richard Li	River Hill H.S., MD	Maryland	Silver	52
Utsarga Sikder	S. Brunswick H.S., NJ	North Jersey	Bronze	94

2011—Ankara, Turkey—43rd IChO

Name	School	Local Section	Medals	Ranking
Konstantin Borisov	North Allegheny H.S., PA	Pittsburgh	Gold	9 (of 273)
Joe Tung	Gretchen Whitney H.S., CA	Southern California	Gold	24
Elmer Tan	John P. Stevens H.S., NJ	North Jersey	Silver	48
Tayyab Shah	Vestal H.S., NY	Binghamton	Silver	80

2012—Washington, D.C.—44th IChO

Name	School	Local Section	Medals	Ranking
Chris Hillenbrand	Regis H.S., NY	New York	Gold	16 (of 283)
Sidhart Chand	Detroit Country Day School, MI	Detroit	Silver	64
James Deng	Choate Rosemary Hall, CT	New Haven	Silver	70
Jason Ge	Westview H.S., CA	San Diego	Silver	80

2013—Moscow, Russia—45th IChO

Name	School	Local Section	Medals	Ranking
David Liang	Carmel H.S., IN	Indiana	Gold	21 (of 291)
Runpeng Liu	Ladue Horton Watkins H.S., MO	St. Louis	Gold	26
Stephen Ting	Monta Vista H.S., CA	Santa Clara Valley	Silver	36
Saaket Agrawal	Mira Loma H.S., CA	Sacramento	Silver	47

IChO PARTICIPATING TEAMS RESULTS 1984—2020

2014—Hanoi, Vietnam—46th IChO

Name	School	Local Section	Medals	Ranking
Robert Kao	Edwin O. Smith High School, CT	Connecticut Valley	Gold	28 (of 291)
Derek Wang	North Allegheny Senior High School, PA	Pittsburgh	Silver	41
Stephen Li	Troy High School, MI	Detroit	Silver	44
Andrew Chen	W. Windsor-Plainsboro H.S. South, NJ	Trenton	Silver	50

2015—Baku, Azerbaijan—47th IChO

Name	School	Local Section	Medals	Ranking
David Wang	Monta Vista High School, Cupertino, CA	Santa Clara Valley	Gold	7 (of 290)
Janice Ong	T. Jefferson H.S. for S&T, Alexandria, VA	Washington, DC	Silver	76
Bryce Cai	Barrington High School, IL	Chicago	Silver	82
Soorajnath Boominathan	OK School of Sci. and Math., OK	Oklahoma	Silver	83

2016—Tbilisi, Georgia—48th IChO

Name	School	Local Section	Medals	Ranking
Alex Liu	The Village School, Houston, TX	Greater Houston	Gold	8 (of 264)
Kevin Tang	Solon High School, OH	Cleveland	Silver	44
Joyce Tian	T. Jefferson H.S. for S&T, Alexandria, VA	Washington, DC	Silver	66
Zilu Pan	Canyon Crest Academy, San Diego, CA	San Diego	Bronze	102

2017—Nakhon Pathom, Thailand—49th IChO

Name	School	Local Section	Medals	Ranking
Harrison Wang	Hinsdale Central High School, IL	Chicago	Gold	5 (of 297)
Joshua Park	Lexington High School, MA	Northeastern	Gold	16
Steven Liu	Monta Vista High School, CA	Santa Clara Valley	Gold	28
Brendan Yap	Carmel High School, IN	Indiana	Gold	32

2018—Bratislava, Slovakia, Prague, Czech Republic—50th IChO

Name	School	Local Section	Medals	Ranking
Jeffrey Shi	Marcellus High School, NY	New York	Gold	4 (of 300)
Michelle Lu	Pomperaug High School, CT	New Haven	Gold	10
Andrew Wu	Park Tudor School, IN	Indiana	Gold	12
Yutong Dai	Princeton International School, NY	Princeton	Gold	13

2019—Paris, France—51st IChO

Name	School	Local Section	Medals	Ranking
Yajvan Ravan	Churchill High School, MI	Detroit	Gold	19 (of 309)
Anton Ni	University High School, CA	Orange County	Gold	28
Edward Jin	Arnold O. Beckman High School, CA	Orange County	Gold	30
Albert Liu	North Hollywood High School, CA	Southern California	Silver	59

IChO PARTICIPATING TEAMS RESULTS 1984–2020

2020 – Virtual, Istanbul, Turkey – 52nd IChO

Name	School	Local Section	Medals	Ranking
Alex Li	Lexington High School, MA	Northeastern	Top Gold	1 (of ~~235~~)
Alec Zhu	Lexington High School, MA	Northeastern	Gold	8
Ananthan Sadagopan	Westborough High School, MA	Central Massachusetts	Gold	12
Anugrah Chemparathy	Dougherty Valley High School, CA	California	Gold	24

52nd International Chemistry Olympiad, Istanbul, Turkey
Alpha Nu Team Members essays

Anugrah Chemparathy

When the beginnings of the global pandemic began to cast the plausibility of holding a 2020 IChO in doubt, I was unsure how to feel. While I had been practicing occasionally, I hadn't begun working on anything to fill in the gaps in my understanding that I had uncovered at last year's study camp. However, driven by a stubborn refusal to quit and my own excitement to work on challenging chemistry problems, I forged ahead.

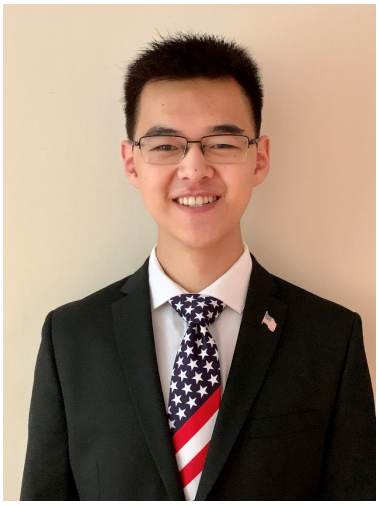
In the weeks leading up to the 2020 study camp however, I was pleased to discover that the time I had spent working on physics and math since the 2019 study camp strongly complemented what I was learning in chemistry. I could now naturally apply various formulas from thermodynamics with ease and words like "Carnot cycle" and "adiabatic" suddenly had concrete meaning to me instead of just being abstract numbers and formulas to plug into each other on a lifeless page, which made applying them so much easier. At the same time, I was discovering how much cleverness was hiding behind each groundbreaking creation of synthetic organic chemistry. What I had once thought were mindless tests of brute force knowledge were actually elegant structural puzzles that required me to use the fundamentals of retrosynthesis and every last bit of cleverness I could muster in order to fill in the missing gaps of a synthesis and recreate (on paper!) the ingenious applications of unorthodox reactions to create some of the most innovative syntheses I had ever seen.

In the weeks after study camp 2020 ended, I decided to work through the IChO tests of past years, many of which were full of intriguing and tricky problems. I relived the experiences of past USA teams by tackling dozens of tricky tasks ranging from the kinetics of amino acid racemization to an iodometric determination of sugars in fruit juice. With one last pass through the preparatory problems, I picked up a few new skills (mostly discovering that even a basic scientific calculator can do linear regression!) and prepared myself for the 5-hour long 2020 IChO Theoretical Exam.

When the day of the test finally arrived, I recall not feeling particularly stressed. I knew that my time spent at study camp this year had more than prepared us all for what was to come. This year's test had a much heavier weighting on organic problems than usual which fit our team's strengths perfectly. While flipping through the test at the beginning, a Carnot cycle caught my

eye as well; thermodynamics had appeared on this year's test despite not being an advanced topic this year! However, thanks to our rigorous training and my own time spent revising, the problems went by quickly and we all got through the test, even the unexpected thermodynamics problem, with only a handful of silly mistakes.

Every hour of my journey starting from last year's in-person study camp, to this year's virtual study camp, and finally culminating in my participation in this year's International Chemistry Olympiad, is perhaps even better characterized by the overwhelming camaraderie I experienced than just some vague description of problem solving. With my USNCO experience coming to a close, I have a whole lot of appreciation to express. I know that so much of what I have accomplished could not have been done without the help of my friends. Special thanks to Edward Jin, Alec Zhu, and Michael Han for teaching me almost everything I know about organic chemistry, and once more to Michael Han for making sure I kept working even when the future was uncertain. And of course, a huge thank you to my parents, my high school chemistry teacher Mr. Schnell, our camp mentors - Melissa, Joe, Ms. Hines, and Mr. Harrison Wang, and so many more for creating the environment that made me excited to learn chemistry.



Alex Li

We all stood for the National Anthem in a small classroom in Brookline, Massachusetts. I was only thirty minutes away from home, yet it felt surreal to know I was representing the United States in Turkey at that moment: it was both exciting and nerve-racking, a distinct honor and a responsibility. While I was surrounded by people I knew in a familiar environment, I couldn't shake off a sense of being away from home, a representative in a foreign place.

Before the exam, my teammates and I had dedicated countless hours to studying the advanced topics, reviewing practice exams, and working through challenging problems. The USNCO Virtual Study Camp was still fresh in our memories: through late evenings playing Skribbl together, fascinating guest lectures, and daily problem-solving sessions, I was able to get to know my fellow campers not only as chemists through collaborative sessions during lectures but also as people by talking about our lives outside of chemistry. The selection exams at the study camp, while very difficult, contained thought-provoking problems that improved all of our problem-solving abilities. The diverse selection of chemistry showcased during the study camp motivated us to continue studying during the weeks leading up to IChO and helped guide our studying in the right direction.

The problems on the exam itself were all unique and related to Turkey in some shape or form. Problem 1 involved the synthesis of a natural product related to two Turkish species of cats –

the Van cat and the Ankara cat; problem 5 discussed β-carotene and carrots and their relation to Konya, a Turkish city known for growing carrots; problem 7 concerned phthalocyanine compounds and Turkish chemist Özer Bekaroğlu's pioneering work in this field; and problem 8 discussed the chemistry of boron, as Turkey is home to 73% of the world's boron reserves. While the tasks showcased a large variety of chemistry, from organic synthesis to quantum chemistry to voltammetry, they were also able to present the host country's history and culture, giving the exam a unique "Turkish" touch.

In the days leading up to the exam, the IChO organizers in Turkey published a daily magazine called the *Catalyzer*, which also helped to showcase Turkey's unique history, as well as research currently being conducted by Turkish chemists. The magazine featured pieces about Turkish cuisine, as well as beautiful photos of cultural sites such as the Topkapi Palace and the Diyarbakir Great Mosque. There were also fascinating articles about the chemistry of lithium-ion batteries, natural dyes, and a new allotrope of carbon (cyclo[18]carbon)! While we, unfortunately, were not able to visit Turkey to see these landmarks in person, it was still interesting to read about them in the *Catalyzer*.

As IChO came to an end, my teammates and all our mentors were anxiously waiting for the closing ceremony. Since the ceremony was happening in the afternoon in Turkey, we hopped into a Zoom party early in the morning. In the ceremony, we watched a short film of beautiful landmarks in Turkey and listened to a talk by IChO 2020 Chairman Professor Hasan Mandal. Shortly after, we watched as the results came in, ever the more anxious as they eventually began displaying silver medal recipients. Finally, the last page of students closed out, and we knew that we had won four gold medals.

Watching the closing ceremony also allowed us to see the students from the other 59 participating countries. While I'm disappointed we weren't able to get to know each other at IChO this year, I hope to meet many of you in the near future.

Finally, none of IChO 2020 would have been possible without the hard work of many dedicated mentors, problem writers, and graders, both here and in Turkey. I would like to thank all of the IChO organizers for their hard work in making this remote competition possible, all of our mentors – Dr. Barringer, Dr. Houck, Dr. Hines, and our peer mentor Harrison Wang – for organizing the study camp and helping us along the way, my local section organizer Steve Lantos for his support and help in proctoring the exam, everyone at ACS and UMD for making the USNCO program possible, and my family and friends for their unwavering support throughout the years.

Alec Zhu

This year has been, in every sense of the word, an extraordinary one. In the few words I have written below, I'll try to describe one fragment of it: the International Chemistry Olympiad (ICHO) as honestly as I can.

At the beginning of the year I think we all believed (or at least hoped) that the pandemic would subside by the summertime, and that it would not disrupt the olympiad. That has clearly not turned out to be true. In the face of school shutdowns and the exponential spread of the coronavirus, holding an examination for more than ten thousand students seemed to be an insurmountable challenge. Yet, extraordinarily, the USNCO task force was able to organize the capability to hold the olympiad online anyways. I would also like to thank my local section (NESACS) for organizing a local exam on such short notice, and hosting the ICHO proctoring.

I cannot really recall what my expectations for the 2020 camp were. After all, how much can you really get out of an online study camp? My assumption was proven completely wrong. It is no exaggeration to say that the 2020 study camp was one of the most enjoyable experiences I had this year (though I won't admit how much of this is because I got to sleep more)! It was an amazing experience to hear from some of the most esteemed figures in chemistry, and to learn about some of the most interesting cutting edge chemistry being done today, such as green chemistry and chalcogen-based glasses (the stuff they don't teach you in textbooks)! I would like to extend the utmost gratitude to the mentors this year for making the study camp one of the best yet. I would also like to thank my peers for all the games of skribble and codenames. In the tradition of the camp naming scheme—where the team name is two Greek letters, the first being α and the second following the order of the Greek letters as the years progress—this year's team was named αν, which phonetically sounds like "al-pha *new*." This year's camp truly lived up to its name: to describe our collective experience during this time as "*new*" would be nothing but a mild understatement!

The ICHO and preparation were very exciting. The first thing that jumps out when one looks at the problems is that they are 50% organic chemistry. Luckily for me, organic chemistry is the field that I enjoy the most, so I can hardly say it felt like work. Among the interesting curiosities of organic chemistry that were covered were the reactions of arynes, which are extremely strained and reactive intermediates containing a triple bond in a benzene ring, and the retro Diels-Alder reaction of species like tetrazines, which contain a whopping four nitrogen atoms in an aromatic ring! One of the more unique topics which came up on the exam was cyclic voltammetry, which

has never come up before on an ICHO. This is an analytical technique which measures the current through an electrode as the applied potential changes back and forth.

Finally, I would like to offer some concluding thoughts. Although the ICHO and its closing ceremony can only be described as being "efficient," the way the USNCO and the study camp has fostered a chemistry community is truly remarkable. At the risk of sounding blasé, I think I can say that these experiences were worth more than any medal: the real medal was the friends we made along the way! Secondly, the amount of chemistry I have learned, and have yet to learn, has progressed beyond my wildest dreams. And by no means can this accurately be described as an individual achievement, so I would like to thank everyone who has helped me along this journey. As the saying goes, "It takes a village…"

Ananthan Sadagopan

Before I begin my essay regarding my IChO experience, I want to thank everyone who helped organize the series of exams leading up to the IChO and everyone who has helped me along the way. This includes my parents, teachers, local section organizers, the USNCO national committee and writers, ACS staff, proctors, camp mentors, lecturers, and Tubitak – I couldn't have had this opportunity without your support.

With that being said, my IChO experience began at the 2020 national exam. I need to thank ACS and the USNCO national committee for being receptive to student feedback and taking steps to be the first major national Olympiad to host a completely online selection. The national exam ran super smoothly, setting a successful precedent for other competitions to follow. I personally enjoyed the questions on the USNCO, with my favorite being the first question in part II related to the decomposition of oxalyl chloride.

After the national exam, I spent a significant amount of time preparing for camp. However, even before USNCO I had already completed all IChOs from 1996 onwards and the preparatory problems for the 2020 competition. Thus, I decided to focus mainly on preparatory problems (2008 IChO – present) in preparation for camp. After finishing this set of problems, I shifted my focus to old Mendeleev problems (2001-2006). These are the problems I ended up using to prepare during camp, with current Mendeleev (2015-present) problems added to the mix. Of these problems, I typically did the inorganic and organic section in the second theoretical tour for each year.
The day before camp I decided to solve all of the preparatory problems an additional time. This decision was extremely useful as many of the problems at camp tested the ideas hinted at on the preparatory problems. For instance, one of the preparatory problems was related to

homologations and in one of the organic schemes on a camp test, the key step was the Seyferth-Gilbert homologation. But camp, of course, is more than just doing chemistry. ACS did a wonderful job making sure we had time for social events; I particularly enjoyed camp Skribbl night and the nights after the final exam where we played Spyfall for hours.

The experience was phenomenal and comparable to the 2019 camp in-person. During the closing banquet, it was an honor being selected for the US IChO team. When the announcement was made, I was in shock for at least ten minutes.

In the coming weeks I began preparing for the IChO, but it was a lot different than my camp preparations. I did the preparatory problems several more times and worked on my endurance by taking past IChOs in a five-hour window. The first one or two hours was usually fine, but after that it would sometimes be quite difficult to concentrate. Over time, however, my endurance greatly improved allowing me to maintain focus for the entire five hours. By the time IChO came around I felt I had completed enough practiced tests and knew the preparatory problems in and out.

The exam itself was fun. I didn't feel very stressed going into it and the organic questions being first actually helped me a lot. It was the area I felt most comfortable completing and given none of the questions were too difficult, it was a great way to get introduced to the exam. Following that, problem 5 was the classic particle-in-a-box problem we were trained how to solve during camp. After completing it, I actually decided to skip question 6 by the look of the first page alone. Thermodynamic cycles were not in the preparatory problems, so we weren't expecting them, and because I did the 2015 IChO preparatory problems recently, I was scared this problem would be very difficult.

Thus, I ended up completing straightforward inorganic questions 7 and 8 before proceeding to question 9. The first time I read this question, I had no idea what was happening, so I decided to take my chances on question 6. I immediately realized it was much easier than what I anticipated; all it was asking for was some simple calculations associated with a Carnot cycle. Then it was back to question 9. After reading through it 4-5 more times, I finally understood the experiment being described and the question then made perfect sense. After completing the question, I had plenty of time to check my work in the other portions of the exam.

At the closing ceremony, I was excited to learn more about Turkish culture and see how the US faired against the other participating countries. Everyone on the team felt confident with their performance, and given historical results, I knew this meant something major could happen. As they slowly scrolled through participants earning honorable mentions, then bronze, then silver medals, I could feel everyone's excitement and tension even through the Zoom call. When they got to the end of the silver medals with no US participants being mentioned, everyone was super

excited. As they announced golds, it was an amazing feeling to see all the faces of the US team appear on the screen; we had just made history – the US had just won the International Chemistry Olympiad.

Press Release

American Chemical Society
External Affairs & Communications

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FOR IMMEDIATE RELEASE

U.S. National Chemistry Olympiad competition goes online

WASHINGTON, May 21, 2020 — The U.S. National Chemistry Olympiad (USNCO) Program is proud to announce the 20 finalists who will participate in the Chemistry Olympiad Virtual Study Camp, May 31-June 12. The students outscored more than 16,000 others to qualify for the intensive virtual camp, where they will receive college-level training with an emphasis on organic chemistry through a series of lectures, problem-solving exercises and tests.

The USNCO Virtual Study Camp is being organized by the American Chemical Society (ACS) in collaboration with the department of chemistry and biochemistry at the University of Maryland, College Park. At the conclusion of the study camp, the top four students will represent the U.S. at the 52nd International Chemistry Olympiad in July. Two additional students will be designated as alternates.

The 20 finalists are:

City/State	Name	High School
Arcadia, Calif.	Alex Dang	Arcadia High School
Irvine, Calif.	Nicholas Ouyang	University High School
San Ramon, Calif.	Anugrah Chemparathy	Dougherty Valley High School
San Ramon, Calif.	*Michael Han	Dougherty Valley High School
Atlanta	*Ridings Bald	The Westminster Schools
Carmel, Ind.	Robbie Ge	Carmel High School
Carmel, Ind.	*Yannik Singh	Carmel High School
Carmel, Ind.	**Iris Yan	Carmel High School
Amherst, Mass.	Andrew Ni	Amherst Regional High School
Lexington, Mass.	**Alex Li	Lexington High School
Lexington, Mass.	*Alec Zhu	Lexington High School
Westborough, Mass.	*Ananthan Sadagopan	Westborough High School
Reno, Nev.	Derek Chien	Davidson Academy
Hackensack, N.J.	Nathan Tang	Bergen County Academies
Princeton, N.J.	Qiyang Zhou	PRISMS
Dallas	*Nicholas Tsao	St. Mark's School of Texas
Katy, Texas	Phoenix Wu	Seven Lakes High School
Katy, Texas	Yitian Zhu	Seven Lakes High School
Alexandria, Va.	Kaien Yang	Thomas Jefferson High School for Science and Technology
Morgantown, W.V.	Sachin Thaker	Morgantown High School

* Students who participated in 2019 USNCO Study Camp
** Students who participated in 2018 and 2019 USNCO Study Camp

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#20-119 Released: 5/21/2020

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Press Release

American Chemical Society
External Affairs & Communications

ACS Chemistry for Life®

FOR IMMEDIATE RELEASE

U.S. National Chemistry Olympiad competition selects America's team

WASHINGTON, June 16, 2020 — The American Chemical Society (ACS) is proud to announce the team that will represent the U.S. in the 52nd International Chemistry Olympiad in July, when teams from around the world will compete for gold, silver and bronze medals. Originally scheduled to take place in Istanbul, Turkey, this year's Olympiad will be held online because of the coronavirus pandemic.

The four members of the U.S. National Chemistry Olympiad (USNCO) team are:

- **Anugrah Chemparathy***, Dougherty Valley High School, San Ramon, Calif.
- **Alex Li****, Lexington High School, Lexington, Mass.
- **Ananthan Sadagopan***, Westborough High School, Westborough, Mass.
- **Alec Zhu***, Lexington High School, Lexington, Mass.

The two alternates are:

- **Nicholas Tsao***, St. Mark's School of Texas, Dallas
- **Michael Han***, Dougherty Valley High School, San Ramon, Calif.

* Students who participated in 2019 USNCO Study Camp
** Student who participated in 2018 and 2019 USNCO Study Camp

U.S. Team Alpha Nu will be supported by these mentors:

- **Melissa Barranger Mathys, Ph.D.,** Ursuline College, Pepper Pike, Ohio, head mentor
- **Joseph Houck, Ph.D.,** Penn State University, University Park, Pa., college mentor
- **Esther Hines**, Billerica Memorial High School, Billerica, Mass., high school mentor

After outscoring more than 16,000 others, 20 students earned an invitation to an intensive virtual study camp, where they received college-level training with an emphasis on organic chemistry through a series of lectures, problem-solving exercises and tests. At the conclusion of the camp, the four highest-scoring students made the USNCO team, Alpha Nu.

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#20-133 Released: 6/16/2020

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The International Chemistry Olympiad originated with Czechoslovakia, Poland and Hungary in 1968. Soon, other Eastern European countries joined the event; Western Europe began participating in 1974. The first U.S. team competed in 1984, winning one silver and two bronze medals.

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Press Release

American Chemical Society
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FOR IMMEDIATE RELEASE

U.S. team earns medals from the 52nd International Chemistry Olympiad

*****Editor's note: Photos and videos available upon request**

Top row (from left): Anugrah Chemparathy, Joseph Houck, Alex Li
Middle row (from left): Ananthan Sadagopan, Melissa Barranger Mathys, Alec Zhu
Bottom row: Esther Hines

Credit: Joseph Houck

WASHINGTON, July 31, 2020 — The American Chemical Society (ACS) is proud to announce that Team USA earned four gold medals at the 52nd International Chemistry Olympiad, with one student earning the top gold medal.

The four members of the U.S. National Chemistry Olympiad (USNCO) team are:

- **Anugrah Chemparathy**, Dougherty Valley High School, San Ramon, Calif.
- **Alex Li**, Lexington High School, Lexington, Mass.
- **Ananthan Sadagopan**, Westborough High School, Westborough, Mass.
- **Alec Zhu**, Lexington High School, Lexington, Mass.

Alex Li won the top gold medal in the competition, placing first in the overall ranking of students.

A total of 235 students from 60 countries competed at this year's remote-access International Chemistry Olympiad, which was coordinated from Istanbul.

"ACS congratulates Team USA on their outstanding performance under extraordinary circumstances in this year's International Chemistry Olympiad," says ACS CEO Thomas Connelly Jr., Ph.D. "As a proud sponsor of the U.S. team, we are always inspired to see the dedication of these students throughout the Olympiad process. We are especially excited this year to celebrate the team's success in earning four gold medals, including the top gold medal in the competition."

Three mentors supported Team USA leading up to the international competition: Melissa Barranger Mathys, Ph.D., Ursuline College in Pepper Pike, Ohio, head mentor; Joseph Houck, Ph.D., Penn State University in University Park, Pa., college mentor; and Esther Hines, Billerica Memorial High School in Billerica, Mass., high school mentor.

Previously, Team USA won four gold medals in 2017 and 2018, and members of the U.S. team earned the top gold medals in 1999 and 2000.

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#20-160 Released: 7/31//2020

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USNCO STUDY CAMP PERSONNEL

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Prof Andrei Vedernikov Dept. of Chemistry & Biochemistry University of Maryland College Park	Lecturer, Physical Chemistry
Dr. Garegin Papoian Dept. of Chemistry & Biochemistry University of Maryland College Park	Lecturer, Physical Chemistry
Dr. Efrain Rodriguez Dept. of Chemistry & Biochemistry University of Maryland College Park	Lecturer, Inorganic Chemistry

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