

## **CURRICULUM VITAE**

**ANASTASIOS (Tasios) MELIS, Ph.D.,**

Fellow AAAS

Professor and Editor-in-Chief, PLANTA

Department of Plant and Microbial Biology

111 Koshland Hall

University of California, Berkeley, CA 94720-3102

Tel: (510) 642-8166; Fax: (510) 642-4995;

E-mail: [melis@berkeley.edu](mailto:melis@berkeley.edu); **URL:** <http://pmb.berkeley.edu/profile/amelis>

### **PROFESSIONAL PREPARATION**

**University of Athens** (Greece), School of Physical Sciences and Mathematics: **B.Sc. in Biology** (1970)

**Florida State University** (Tallahassee), Dept. of Biological Science: **Ph.D. in Biological Sciences**

(Emphasis on the Biophysics of Photosynthesis, 1975)

**Rijksuniversiteit Leiden**, The Netherlands, Dept. of Biophysics. **Postdoctoral Training** (1977-79).

**Carnegie Institution, Stanford University**, California, USA. **Postdoctoral Training** (1979-81).

### **PROFESSIONAL APPOINTMENTS**

Florida State University, Tallahassee:

1971-75 International Atomic Energy Agency Fellow (1971-73); Graduate Teaching Assistant (1973-74); Graduate Research Assistant (1974-75).

Greek Atomic Energy Commission:

1975-76 Research Center Democritos, Athens, Institute of Biology

German Scientific Exchange Program Fellow (DAAD):

1976-77 Weizmann Institute of Science, Rehovot-Israel, Department of Biochemistry

European Molecular Biology Organization:

1977-79 Research Fellow, Rijksuniversiteit Leiden, Holland, Dept. of Biophysics

Stanford University, Stanford, California:

1979-81 Research Fellow, Carnegie Institution for Science, Dept. of Plant Biology

University of California, Berkeley:

1981-84 Assistant Professor, Division of Molecular Plant Biology

1984-86 Associate Professor, Division of Molecular Plant Biology

1986-present Professor, Department of Plant and Microbial Biology

1994-98 Vice Chair, Department of Plant and Microbial Biology

**EDITORIAL SERVICE:** Editor-in-Chief, **Planta** (January 2002 - present).

### **FELLOWSHIPS / HONORS**

IAEA International Atomic Energy Agency Fellowship (1971-73)

DAAD Deutscher Akademischer Austauschdienst Fellowship (1976-77)

EMBO European Molecular Biology Organization Fellowship (1977-79)

Carnegie Institution Fellowship (1979-81)

Swedish Natural Science Research Council, Invited Professor Fellowship (May-August, 1985)

At University of Lund, Department of Biochemistry

British Science and Engineering Research Council, Invited Professor Fellowship (April-August 1988)

At University of Leeds, Department of Pure and Applied Biology

Pacific Rim Faculty Exchange Program Fellowship (1988-89)

At CSIRO, Plant Industry Division, Canberra, Australia.

NATO International Scientific Exchange Program Fellowship (1992-96)

At University of Hamburg, Germany

Japanese Monbusho (Ministry of Education, Science and Technology) Research Award (1992-94)

At NIBB, National Institute for Basic Biology, Okazaki, Japan

Distinguished Teaching Award, UC Berkeley, College of Natural Resources (1994)

DaimlerChrysler "University Research Award" (2003)

US DOE, Hydrogen Program Research Achievement Award (2004)

Elected to the rank of Fellow, American Association for the Advancement of Science (AAAS), 2011

## **PROFESSIONAL ACTIVITIES**

1. Co-organizer with Professor Yoshihiko Fujita (National Institute for Basic Biology, Japan) of the 28th International NIBB Conference. Held on February 26-29, 1992 in Okazaki, Japan. Title: Dynamics of thylakoid membrane assembly. Attended by 50 individuals.
2. Organizer of the 2nd Western Photosynthesis Conference held on January 12-15, 1993 at the Asilomar Conference Center, Pacific Grove, California. Attended by 155 individuals.
3. Co-organizer and Chair of the '98 International CTI-IEA (Climate and Technology Initiative-International Energy Agency) Workshop at UC Berkeley (11-14 Jan 1998). Attended by 15 delegates.
4. Convener and Chair of the Photosynthesis/Photoinhibition session in the 8th International Conference on the Cell and Molecular Biology of *Chlamydomonas*. Granlibakken Conference Center, Tahoe City, CA. 2-7 June 1998)
5. Convener and Chair, Minisymposium on Algal Physiology. Annual Meeting of the American Society of Plant Physiologists. San Diego, July 15-19, 2000.
6. DOE Hydrogen, Fuel Cells and Infrastructure Technologies Program Review Panel (June 2008-2011)
7. Science Foundation of Arizona (SFAz) Review Panel Member (2008) and Chair of the Panel (2010).
8. DOE ARPA-E workshop plenary speaker and workshop participant (December 2010).
9. DOE Office of Science on Biological and Environmental Research Review Panel (February 2011).
10. DOE Office of Biomass Programs on Algae Biomass Review Panel (April 2011 and May 2013).
12. Founder and Director of the College of Natural Resources Honors Research Program (1995-2017).

## **PATENTS**

1. Melis A, Zhang L, Benemann JR, Forestier M, Ghirardi ML, Seibert M (2006) Hydrogen production using hydrogenase-containing oxygenic photosynthetic organisms. **United States Patent 6,989,252 B2** (issued 24-Jan-2006)
2. Melis A and Chen H-C (2007) Modulation of sulfate permease for photosynthetic hydrogen production. **United States Patent 7,176,005** (issued 13-Feb-2007).
3. Melis A and Mitra M (2010) Suppression of *Tla1* gene expression for improved solar conversion efficiency and photosynthetic productivity in plants and algae. **United States Patent 7,745,696** (issued 29-June-2010)
4. Melis A (2011) Short chain volatile hydrocarbon production using genetically engineered microalgae, cyanobacteria or bacteria. **United States Patent 7,947,478** (issued 24-May-2011)
5. Melis A (2012) Short chain volatile hydrocarbon production using genetically engineered microalgae, cyanobacteria or bacteria. **United States Patent 8,133,708** (cyanobacteria; issued 13-Mar-2012)
6. Melis A, Lindberg P (2014) Isoprene hydrocarbon production using genetically engineered cyanobacteria. **United States Patent 8,802,407** (issued 12-August-2014)
7. Melis A, Bentley FK, Wintz H-C Chen (2015) Continuous diffusion-based method of cultivating photosynthetic microorganisms in a sealed photobioreactor to obtain volatile hydrocarbons. **United States Patent 8,993,290** (issued 31-March-2015).
8. Melis A, Bentley FK, Chen Wintz H-C (2016) Diffusion-based method for obtaining volatile hydrocarbons produced by photosynthetic microorganisms in two-phase bioreactors. **Australian Patent 2012245238** (issued 10 March 2016).
9. Melis A, Bentley F, Wintz Chen H-C, Zurbruggen A (2018) Production of beta-phellandrene using genetically engineered cyanobacteria. **United States Patent 9,951,354** (issued 24-April-2018).
10. Melis A, Bentley FK, Wintz H-C, Zurbruggen A (2019) Production of  $\beta$ -phellandrene using genetically engineered cyanobacteria. **Australian Patent 2013217130** (issued January 24, 2019).

## **EDITORIAL SERVICE (last 5-years)**

Editor-in-Chief, **Planta** (January 2002 - present).

## **REGULARLY SCHEDULED TEACHING DUTIES (last 5-years)**

### Undergraduate

General Biology (Bio 1A, 3 semester units)

Physiology and Biochemistry of Plants (PLANTBI 135, 3 semester units)

Bioenergy (PLANTBI 122, 2 semester units)

### Graduate

Plant and Microbial Photosynthesis (PLANTBI 290. 1 semester unit)

## **SOCIETY MEMBERSHIPS**

American Association for the Advancement of Science; American Chemical Society; American Society for Biochemistry and Molecular Biology; American Society of Plant Biologists; International Society for Photosynthesis Research; The Genetics Society of America

## **MELIS LAB EXPERTISE AND PHILOSOPHY**

The expertise of the Melis lab is in the field of photosynthesis and metabolism. We work with land plants, microalgae, cyanobacteria, and non-oxygenic (anaerobic) photosynthetic bacteria. Our platform includes most aspects of photosynthesis, beginning with organism cultivation, the efficiency of light absorption and utilization, electron transport and biochemical energy generation, and chloroplast and cellular metabolism. Included are the biophysics and biochemistry of the process, the molecular biology and genetics of the organisms, as well as scale ups in the cultivation of the various organisms for product generation.

The concept of "Photosynthetic Biofuels", envisioned and pioneered by us, entails the direct application of photosynthesis for the generation of fuels and chemicals, in a process where a single organism operates in two capacities: as catalyst and processor, synthesizing and secreting ready to use commodity products.

The lab contributed with a breakthrough in the field, when in 2000 we demonstrated, for the first time, how to sustainably divert the natural flow of photosynthesis in microalgae and to generate hydrogen gas, instead of the normally produced oxygen. In 2010, the Melis lab pioneered yet a new platform for the renewable generation of isoprene (C<sub>5</sub>H<sub>8</sub>) hydrocarbons, derived entirely from sunlight, carbon dioxide (CO<sub>2</sub>) and water (H<sub>2</sub>O) from microalgae and cyanobacteria. The process of generating isoprene (C<sub>5</sub>H<sub>8</sub>) hydrocarbons, currently serves as a case study in the development of technologies for the renewable generation of a multitude of biofuels and other useful bio-products.

The Melis lab also pioneered and currently leads an international effort to improve, by up to 300%, the efficiency and productivity of photosynthesis under bright sunlight conditions in mass cultures of microalgae/cyanobacteria, and high-density canopy of crop plants. This has been achieved upon genetically minimizing the array of chlorophyll molecules that serve as antennae in the absorbance of sunlight for the photosynthetic apparatus.

In sum, the Melis lab has succeeded in diverting the flow of photosynthesis toward alternative high-impact bio-products instead of the normally produced sugars. A number of "blueprints" are currently in the R&D stage, leading to the generation of fuels and feedstock for the synthetic chemistry industry. The trademark of our approach is product generation directly from photosynthesis, and spontaneous product separation from the organism, bypassing the need to harvest and process the respective biomass.

## **HYDROGEN AND HYDROCARBON BIOFUELS PRODUCTION VIA MICROALGAL PHOTOSYNTHESIS**

Hydrogen and hydrocarbon biofuels may become the primary 21st century energy carriers in California and the nation. Modification of photosynthesis in microalgae may permit the generation of these biofuels as clean, renewable and economically viable commodities. However, specific biological problems associated with a sustained, high yield photosynthetic production of these biofuels remain to be addressed.

## **RELATED AND CURRENTLY ON-GOING RESEARCH IN THE MELIS LAB:**

Maximizing the solar-to-chemical energy conversion efficiency and productivity of photosynthesis in plants and algae under mass culture or high canopy density conditions.

Improving the continuity and yield of microalgal terpene hydrocarbons production.

Applying metabolic engineering to reprogram photosynthesis and direct flux toward biofuels, high value bio-products, and feedstock for the synthetic chemistry industry.

## PUBLICATIONS (last 5-years) Peer-reviewed Papers, Reviews and Book Chapters

249. Kirst H, Melis A (2014) The chloroplast *Signal Recognition Particle* pathway (CpSRP) as a tool to minimize chlorophyll antenna size and maximize photosynthetic productivity. *Biotechnology Advances* 32: 66–72 DOI: [10.1016/j.biotechadv.2013.08.018](https://doi.org/10.1016/j.biotechadv.2013.08.018)
250. Bentley FK, Zurbriggen A, Melis A (2014) Heterologous expression of the mevalonic acid pathway in cyanobacteria enhances endogenous carbon partitioning to isoprene. *Molecular Plant* 7:71-86; doi:[10.1093/mp/sst134](https://doi.org/10.1093/mp/sst134)
251. Formighieri C, Melis A (2014) Regulation of  $\beta$ -phellandrene synthase gene expression, recombinant protein accumulation, and monoterpene hydrocarbons production in *Synechocystis* transformants. *Planta* 240:309–324 DOI: [10.1007/s00425-014-2080-8](https://doi.org/10.1007/s00425-014-2080-8)
252. Kirst H, Formighieri C, Melis A (2014) Maximizing photosynthetic efficiency and culture productivity in cyanobacteria upon minimizing the phycobilisome light-harvesting antenna size. *Biochim Biophys Acta - Bioenergetics* 1837(10):1653-1664 DOI: [10.1016/j.bbabi.2014.07.009](https://doi.org/10.1016/j.bbabi.2014.07.009)
253. Melis A, Lindberg P (2014) Isoprene hydrocarbon production using genetically engineered cyanobacteria. **United States Patent 8,802,407** (issued 12-August-2014)
254. Formighieri C, Melis A (2014) Carbon partitioning to the terpenoid biosynthetic pathway enables heterologous  $\beta$ -phellandrene production in *Escherichia coli* cultures. *Arch Microbiol* 196(12):853-861 DOI [10.1007/s00203-014-1024-9](https://doi.org/10.1007/s00203-014-1024-9)
255. Chaves JE, Kirst H, Melis A (2015) Isoprene production in *Synechocystis* under alkaline and saline growth conditions. *J Appl Phycol* 27:1089–1097 DOI: [10.1007/s10811-014-0395-2](https://doi.org/10.1007/s10811-014-0395-2)
256. Melis A, Bentley FK, Wintz H-C Chen (2015) Continuous diffusion-based method of cultivating photosynthetic microorganisms in a sealed photobioreactor to obtain volatile hydrocarbons. **United States Patent 8,993,290** (issued 31-March-2015).
257. Formighieri C, Melis A (2015) A phycocyanin•phellandrene synthase fusion enhances recombinant protein expression and  $\beta$ -phellandrene (monoterpene) hydrocarbons production in *Synechocystis* (cyanobacteria). *Metab Eng* 32:116–124. <http://dx.doi.org/10.1016/j.ymben.2015.09.010>
258. Formighieri C, Melis A (2016) Sustainable heterologous production of terpene hydrocarbons in cyanobacteria. *Photosynth Res* 130:123-135. DOI [10.1007/s11120-016-0233-2](https://doi.org/10.1007/s11120-016-0233-2)
259. Melis A, Bentley FK, Chen Wintz H-C (2016) Diffusion-based method for obtaining volatile hydrocarbons produced by photosynthetic microorganisms in two-phase bioreactors. **Australian Patent 2012245238** (issued 10 March 2016; issued 24-April-2018, licensed to the private sector).
260. Melis A (2016) Maximizing light utilization efficiency and hydrogen production in microalgal cultures. US Department of Energy (DE-FG36-05GO15041) Final Technical Report. DOI: [10.2172/1225978](https://doi.org/10.2172/1225978)
261. Eroglu E, Melis A (2016) Microalgal hydrogen production research. *Intl. J. Hydrogen Energy* 41:12772-12798. doi: [10.1016/j.ijhydene.2016.05.115](https://doi.org/10.1016/j.ijhydene.2016.05.115)
262. Chaves JE, Rueda Romero P, Kirst H, Melis A (2016) Role of isopentenyl-diphosphate isomerase in heterologous cyanobacterial (*Synechocystis*) isoprene production. *Photosynth Res* 130:517-527. DOI: [10.1007/s11120-016-0293-3](https://doi.org/10.1007/s11120-016-0293-3)
263. Baek K, Kim DH, Jeong J, Sim SJ, Melis A, Kim JS, Jin E, Bae S (2016) DNA-free two-gene knockout in *Chlamydomonas reinhardtii* via CRISPR-Cas9 ribonucleoproteins. *SciRep* 6:30620. doi: [10.1038/srep30620](https://doi.org/10.1038/srep30620) (2016).
264. Jeong J, Baek K, Kirst H, Melis A, Jin E (2017) Loss of CpSRP54 function leads to a truncated light-harvesting antenna size in *Chlamydomonas reinhardtii*. *Biochim Biophys Acta* 1858:45–55. doi: [10.1016/j.bbabi.2016.10.007](https://doi.org/10.1016/j.bbabi.2016.10.007).
265. Melis A (2017) Terpene hydrocarbons production in cyanobacteria. Chapter 9 in the book entitled *Cyanobacteria – Omics and Manipulation*. Dmitry A. Los, ed. Caister Academic Press, pp. 187-198. Accession Number: WOS:000388010300010; ISBN:978-1-910190-55-5; 978-1-910190-56-2
266. Formighieri C, Melis A (2017) Heterologous synthesis of geranylinalool, a diterpenol plant product, in the cyanobacterium *Synechocystis*. *Appl Microbiol Biotechnol* 101:2791-2800 doi: [10.1007/s00253-016-8081-8](https://doi.org/10.1007/s00253-016-8081-8)
267. Kirst H, Gabilly, ST, Niyogi KK, Lemaux PG, Melis A (2017) Photosynthetic antenna engineering to improve crop yields. *Planta* 245:1009–1020. [10.1007/s00425-017-2659-y](https://doi.org/10.1007/s00425-017-2659-y)

268. Chaves JE, Rueda-Romero P, Kirst H, Melis A (2017) Engineering isoprene synthase expression and activity in cyanobacteria. *ACS Synth Biol* 6:2281-2292 <http://dx.doi.org/10.1021/acssynbio.7b00214>
269. Jeong J, Baek K, Jihyeon Yu J, Kirst H, Betterle N, Shin W, Bae S, Melis A, Jin ES (2018) Deletion of the chloroplast LTD protein impedes LHCl import and PSI-LHCl assembly in *Chlamydomonas reinhardtii*. *J Exp Bot.* 69:1147-1158. <https://doi.org/10.1093/jxb/erx457>
270. Kirst H, Melis A (2018) Improving photosynthetic solar energy conversion efficiency: The truncated light-harvesting antenna (TLA) concept. **Chapter 14** in *Microalgal Hydrogen Production: Achievements and Perspectives*. Seibert M, Torzillo G, Eds. European Society for Photobiology 2018. Published by the Royal Society of Chemistry, London. Pp. 335-353
271. Betterle N, Melis A (2018) Heterologous leader sequences in fusion constructs enhance expression of geranyl diphosphate synthase and yield of  $\beta$ -phellandrene production in cyanobacteria (*Synechocystis*). *ACS Synth Biol* 7:912–921 <http://dx.doi.org/10.1021/acssynbio.7b00431>
272. Kirst H, Shen YX, Vamvaka E, Betterle N, Xu DM, Warek U, Strickland JA, Melis A (2018) Downregulation of the *CpSRP43* gene expression confers a truncated light-harvesting antenna (TLA) and enhances biomass and leaf-to-stem ratio in *Nicotiana tabacum* canopies. *Planta* 248:139–154 DOI [10.1007/s00425-018-2889-7](https://doi.org/10.1007/s00425-018-2889-7)
273. Chaves JE, Melis A (2018) Engineering isoprene synthesis in cyanobacteria. *FEBS Lett* 12:2059-2069; doi:[10.1002/1873-3468.13052](https://doi.org/10.1002/1873-3468.13052)
274. Melis A, Bentley F, Wintz Chen H-C, Zurbriggen A (2018) Production of  $\beta$ -phellandrene using genetically engineered cyanobacteria. **United States Patent 9,951,354** (issued 24-April-2018; licensed to the private sector).
275. Chaves JE, Melis A (2018) Biotechnology of cyanobacterial isoprene production. *Appl Microbiol Biotechnol* 102(15):6451-6458 <https://doi.org/10.1007/s00253-018-9093-3>
276. Formighieri C, Melis A (2018) Cyanobacterial production of plant essential oils. *Planta* 248(4):933-946 DOI: [10.1007/s00425-018-2948-0](https://doi.org/10.1007/s00425-018-2948-0)
277. Chaves JE, Melis A (2018) Synthetic construct beta-phycoerythrin linker 7 isoprene synthase fusion (cpcB\*L7\*IspS) gene, complete cds. GenBank accession number MG855740
278. Chaves JE, Melis A (2018) Synthetic construct beta-phycoerythrin linker 16 isoprene synthase fusion protein (cpcB\*L16\*IspS) gene, complete cds. GenBank accession number MG855741
279. Chaves JE, Melis A (2018) Synthetic construct FNI-IPP isomerase protein gene, complete cds. GenBank accession number MG855742
280. Melis A, Bentley FK, Wintz H-C, Zurbriggen A (2019) Production of  $\beta$ -phellandrene using genetically engineered cyanobacteria. **Australian Patent 2013217130** (issued January 24, 2019).
281. Betterle N, Melis A (2019) Photosynthetic generation of heterologous terpenoids in cyanobacteria. *Biotechnology and Bioengineering IN PRESS* DOI: [10.1002/bit.26988](https://doi.org/10.1002/bit.26988)

### **INVITED SEMINARS AND LECTURES (last 5-years)**

161. **University of California, Davis.** Plant Sciences Departmental Seminar Speaker. Title of invited seminar: Photosynthesis for Fuel and Chemicals Production. Friday, February 21, 2014.
162. **The 4<sup>th</sup> Korea Carbon Capture and Storage International Conference.** Jeju, South Korea. Title of invited plenary lecture: Microalgal photosynthesis for carbon sequestration and fuel and chemicals production. Wednesday, February 26, 2014.
163. **Hanyang University, Seoul, South Korea.** Departmental of Biology Seminar Speaker. Title of invited seminar: Measurement of theoretical maximum and experimentally achievable productivity of photosynthesis. Thursday, February 27, 2014.
164. **Inha University, Incheon, South Korea.** Department of Biological Engineering Seminar Speaker. Title of invited seminar: Photosynthesis for Fuel and Chemicals Production. Friday, Feb. 28, 2014.
165. **ITC Limited, Bangalore, India.** ITC Technology Day 2014 Invited Keynote Address. Title: Metabolic engineering to redirect photosynthesis toward biofuels, high value bio-products and nutraceuticals from tobacco. Friday, June 6, 2014.
167. **IUPAB International Biophysics Congress 2014, Brisbane, Australia.** Invited Keynote Presentation. Title: Solar energy conversion efficiencies in photosynthesis: Minimizing the chlorophyll antennae to maximize efficiency. Wednesday, August 6, 2014.
168. **University of Crete, Greece.** Department of Chemistry and Biochemistry. Title of invited seminar: Photosynthesis for Fuel and Chemicals Production. Friday, October 3, 2014.

169. **Washington University, Saint Louis.** Department of Biology Seminar Speaker. Title of invited seminar: Photosynthetic generation of fuel and chemicals. Monday, April 6, 2015.
170. **First International Solar Fuels Conference, Uppsala, Sweden.** Title of invited Opening Plenary Lecture: Photosynthesis for fuel and chemicals production. Sunday, April 26, 2015.
171. **International Conference on Photosynthesis Research for Sustainability, Crete, Greece, plenary lecture.** Title: Photosynthesis for fuel and chemicals production. Tuesday, Sept. 22, 2015.
172. **International Plant Molecular Biology Congress, Iguassu Falls, Brazil, symposium lecture.** Title: Photosynthetic generation of terpene-derived fuel and chemicals. Tuesday, October 27, 2015
173. **USDA AES Multistate Research Project NC1200 Annual Meeting, Saint Louis, MO, project presentation.** Title: "Regulation of photosynthetic processes. Saturday, November 7, 2015
174. **Korean institute of Science and Technology, Seoul, South Korea, invited lecture.** Title: Synthetic biology for fuel and chemicals production. Tuesday, March 22, 2016
175. **Hanyang University, Department of Life Science and Research Institute for Natural Sciences, Seoul, South Korea, invited departmental seminar.** Title: Synthetic biology for fuel and chemicals production. Wednesday, March 23, 2016.
176. **17<sup>th</sup> International Congress on Photosynthesis Research, Maastricht, The Netherlands, invited parallel symposia presentation on *Metabolites and Pathways*.** Title: **Photosynthetic metabolites & pathways: Terpene fuel and chemicals production.** Thursday, August 11, 2016
177. **USDA Agricultural Experiment Station Multistate Research Project NC1200 Annual Meeting, Bozeman, MT, project presentation.** Title: **Mechanisms regulating photosynthate partitioning.** Saturday, October 1, 2016
178. **International Conference on Plant Synthetic Biology and Bioengineering 2016 (December 16-18, 2016, The Palms Hotel, Miami Beach, FL).** Title of invited lecture: Photosynthetic antenna engineering to improve crop yields. Saturday, December 17, 2016.
179. **Gordon Research Conference on Chloroplast Biotechnology: Breaking Ground Toward Plant Synthetic Biology. Ventura Beach Marriott, Ventura, CA.** Title of invited lecture: Increasing crop plant canopy productivity upon decreasing the light-harvesting antenna size of photosynthesis. Thursday 12-Jan-2017 (Delivery made by Melis lab postdoctoral research scholar Dr. Henning Kirst)
180. **7<sup>th</sup> International Conference on Algal Biomass, Biofuels & Bioproducts, Miami, FL.** Title of invited plenary lecture [PLN9]: Cyanobacterial production of terpene compounds. Wed, Jun 21, 2017.
181. **7<sup>th</sup> International Conference on Algal Biomass, Biofuels & Bioproducts, Miami, FL.** Title of invited session-A lecture [4A.6]: Remodeling terpenoid metabolism in cyanobacteria for photosynthetic production of isoprene. Tuesday, June 20, 2017. (Delivery of lecture by Melis lab graduate student Julie E. Chaves.)
182. **Plant Biology 2017 (Annual meeting of the ASPB), Honolulu, Hawaii.** Title of invited Concurrent Symposium 28: Light Biology presentation [CS-28-5]: Photosynthetic antenna engineering to improve crop plant yields. Tuesday, June 27, 2017.
183. **2nd Biannual International Solar Fuels Conference, San Diego, CA.** Metabolic Engineering and Synthetic Biology Session. Title of invited presentation: Remodeling terpenoid metabolism in cyanobacteria for photosynthetic production of isoprene. July 9, 2017. (Delivery of lecture by Melis lab graduate student Julie E. Chaves.)
184. **USDA Agricultural Experiment Station Multistate Research Project NC1200 Annual Meeting, Arlington, VA, project presentation.** Title: "Photosynthetic antenna engineering to improve crop yields. Saturday, November 11, 2017
185. **National Center for Scientific Research "Demokritos", Athens, Greece.** Title of invited Lecture: On fuels and chemicals: cyanobacterial heterologous terpene hydrocarbons production. Tuesday, April 17, 2018.
186. **8<sup>th</sup> International Conference on Algal Biomass, Biofuels & Bioproducts, Seattle, WA.** Title of invited presentation [O1.16]: Engineering terpenoid metabolism in cyanobacteria for isoprene production". Tuesday, June 12, 2018
187. **The 1<sup>st</sup> European Congress on Photosynthesis Research, Uppsala, Sweden.** Title of invited presentation [E:6]: Photosynthetic antenna engineering to improve crop yields. Tuesday, June 26, 2018 (Delivered of lecture by Melis lab postdoc Dr. Henning Kirst).
188. **USDA Agricultural Experiment Station Multistate Research Project NC1200 Annual Meeting, Saint Louis, MO, project presentation.** Title: "Photosynthetic antenna engineering to improve crop yields. Saturday, October 27, 2018