

Materials for Renewable Energy 2010

from 28 May 2010 to 2 June 2010 Erice (Sicily-Italy)

Europe/Rome timezone

67 students
10 USA
5 Israel
20 EU (out of Italy)
32 Italy

Ettore Majorana Foundation and Centre for Scientific Culture

From left to right: John Poate, Stewart Polite Jr. (16 years old prodigy student)., Antonio Terrasi, Abdelilah Slaoui, David Ginley and Emanuele Rimini

8:00-8:30 10:30 11:00 13:00 15:00 17:00 17:30 11:00 13:00 15:00 17:00 17:30 19:00 Evening 8:30-10:30 Introduction P. Waide A. McEvoy Seminar or Dinner Fri. Coffee Coffee break L. Orr Energy Lunch Energy: posters or May 28th CO2 Global break Balance break The Big Picture round table chattering Warming and wine J. Poate Coffee D. Carlson Coffee break Seminar or M. Hadjieva Lunch Dinner Sat. Conventional break Solar Thermal break Conventional posters or May 29th Technologies **Photovoltaics** round table chattering and wine Coffee B. J. Stanbery A. Marti' Excursion Dinner Sun. **Photovoltaics Photovoltaics** break (Lunch bag) May 30th Thin films 3rd generation chattering and wine Coffee Coffee break H. Atwater D. Ginley Lunch S. Coffa Seminar or Dinner Mon. Si wires and break Organic break **Photovoltaics** posters or May 31st plasmonics for Photovoltaics Industry round table chattering **Photovoltaics** and wine Coffee break J. Poortmans Coffee D. Cahen Lunch N. Pugliano Seminar or Dinner Tue. **Photovoltaics** break Fuels via break Green Chemistry posters or June 1st Overview Solar Energy round table chattering and wine Coffee Lunch Coffee break Gala D. Ginley R. O'Havre M. Schreckenberg Conclusions Wed. break Fuel Cells Storage break Vehicles Dinner June 2nd

SCHOOL TIMETABLE



Materials for Renewable Energy 2012

18-28 July 2012 Erice (Sicily-Italy)

Ettore Majorana Foundation and Centre for Scientific Culture

65 students

29 Italy

10 USA

16 EU (out of Italy)

5 Africa

3 Turkey

1 Israel

1 Brasil

ERICE 2012 TIMETABLE

	8:30 10:30	10:30 11:00	11:00 13:00	13:00 15:00	15:00 17:00	17:00 17:30	17:30 19:00	Evening		
Wed. July 18 th	8:00-8:30 WELCOME Lynn Orr Energy Overview	Coffee break	John Poate Critical Materials Issue for the Energy World	Lunch break	Jacques Amouroux Carbon capture and recycling for energy storage	Coffee break	Inputs for student team activity and material distribution	Dinner		
Thu. July 19 th	Dannie Jost Climate Change Governance and Renewable Energy	Coffee break	Salvo Lombardo Charge generation and transport in PV	Lunch break	Dave Carlson Conventional PV	Coffee break	SEMINAR Harry Atwater Solar Fuels – the Joint Center for Artificial Photosynthesis (JCAP)	Dinner		
Fri. July 20 th	Gianluca Timò Concentrating PV	Coffee break	Billy Stanbery Thin film PV CIGS, CZTS	Lunch break	Cosimo Gerardi PV Industry	Coffee break	Poster session	Dinner		
Sat. July 21 st	Dave Ginley Organic/Dye PV	Coffee break	Harry Atwater Photonic design principles for high efficiency photovoltaics	Lunch break	Eli Yablonovitch The Opto-Electronic physics which just broke the efficiency record in solar cells	Coffee break	Poster session	Dinner		
Sun. July 22 nd	FREE (Lunch bag)									
Mon. July 23 rd	Eli Yablonovitch "Electrically Created Fuels"	Coffee break	Werner F. Kuhs Hydrates	Lunch break	Joachim Peinke Wind Energy	Coffee break	SEMINAR Dave Ginley Smart Grid	Dinner		

ERICE 2012 TIMETABLE

	8:30 10:30	10:30 11:00	11:00 13:00 15:00 15:00 15:00		17:00 17:30	17:30 19:00	Evening	
Tue. July 24 th	Giovanni Ricco Nuclear Energy I	Coffee break	Giovanni Ricco Nuclear Energy II	Lunch break	Florence Jaudin Geothermal	Coffee break	SEMINAR Andrea Cuomo (President of 3Sun) PV Industrial Perspectives	Dinner
Wed. July 25 th	William Tumas Green Chemistry	Coffee break	Anke Weidenkaff Thermoelectricity	Excursion (Lunch bag)			Dinner	
Thu. July 26 th	Laura Meda Solar Water splitting	Coffee break	David Cahen Solar fuels and Artificial photosynthesis I	s and break Solar fuels and Artificial break Student to photosynthesis II		Student team	Dinner	
Fri. July 27 th	Daniele Consoli Concentrated Solar Power	Coffee break	Ryan O'Hayre Fuel Cells Energy Conversion	Fuel Cells break Fuel Cells break Student to		Student team	Dinner	
Sat. July 28 th	Sabrina Sartori Hydrogen storage for vehicular applications	Coffee break	Dannie Jost Patenting Systems, Patentable Subject Matter, and Prior Art	Lunch break	Student team reports	Coffee break	Conclusions	Social Dinner



International School "Materials for Renewable Energy" 2014 (12-18 July 2014)

12-19 July 2014

Ettore Majorana Foundation and Centre for Scientific Culture

76 students

23 Italy

9 USA

24 EU (out of Italy)

10 Africa

3 Turkey

5 Israel

1 Singapore

1 Thailand

ERICE 2014 PROGRAM



	8:45 10:15	10:15 11:15	11:15 11:45	11:45 12:45	12:45 14:45	15:30 16:30	16:30 17:30	17:30 18:00	18:00 18:45	19:30 23:00	
Sat. July 12 th	8:45-9:00 WELCOME Energy: The Big Picture Ahmed Hamza H. Ali	Critical materials for energy Alex King	Coffee break	Nuclear energy Claude Degueldre	Lunch break	CO ₂ sequestration and recycling Sally Benson	Water-energy nexus Jörg E. Drewes	Coffee break	EU Project "Water" Vittorio Privitera	Dinner	
Sun. July 13 th	Silicon based photovoltaics, technologies and market Abdelilah Slaoui	Optics for Solar Energy Conversion Harry Atwater	Coffee break	CIGS-CZTS Solar cells Hans-Werner Schock	Lunch break	Next Generations PV OPV/QD/Perovskite s/ETA David Ginley	High-efficiency photovoltaics by nanophotonic design Albert Polman	Coffee break	Distretto Tec. Sicilia Micro e Nano Sistemi PON Project "Energetic" Salvo Lombardo	Dinner	
Mon. July 14 th	Concentrated Solar Power Javier Garcia Barberena Labiano	Thermoelectricity Piezoelectricity Anke Weidenkaff	Coffee break	Geothermal Ernst Huenges	Lunch break	Teams work alone solving problems DG+DC with SB		Coffee break	Checking problem results	Dinner Poster session	
Tue. July 15 th	Photosynthesis David Cahen (8:45-9:45)	Solar fuels William Tumas (9:45-11:15)	Coffee break	BioFuels David Cahen	Lunch break	Excursion + Dinner					
Wed. July 16 th	Fuel cells Ryan O'Hayre	Hydrogen Sabrina Sartori	Coffee break	Wind Joachim Peinke	Lunch break	Teams prepare presentations with supervisors					
Thu. July 17 th	Batteries and storage Ryan O'Hayre	Smart Grid David Ginley	Coffee break	Patents and law regulations Dannie Jost	Lunch break	Teams prepare presentations with supervisors				Dinner	
Fri. July 18 th		student teams entations)	Coffee break	Lectures by student teams (3 presentations)	Lunch break		Trip to Trapani E	Beach		Social Dinner + Prizes	



International School for Materials for Energy and Sustainability (ISMES IV)

July 13 – 20, 2015 Colorado School of Mines • Golden, Colorado USA

Topics

- Global Overview
- Energy Overview
- Critical Materials for Energy
- Energy Analysis
- Unconventional Materials for Energy
- Nuclear Energy Including Fusion
- Gas/Oil/Coal and Fracking
- Solar Energy PV
- Wind Energy
- Geothermal
- Thermoelectricity/Piezoelectricity
- Building Technology Future
- ... and more

Lecturers

- Harry Atwater :: Caltech
- Sally Benson :: Stanford
- David Cahen :: Weizman Institute
- George Crabtree :: Argonne Labs
- David Ginley :: NREL
- Sossina Haile :: Caltech
- Carolyn Koh :: Colorado School of Mines
- ... and more

Information

http://csmspace.com/events/ismes

Sponsors















"Materials for Energy and Sustainability-V" 5th course "EPS-SIF International School on Energy" 3rd course 2016, 13-19 July

13-19 July 2016 Erice - ITALY

Ettore Majorana Foundation and Centre for Scientific Culture

79 students (joined with SIF and EPS school)

16 Italy

5 USA

24 EU (out of Italy)

29 Africa

(EUROSUNMED Project!)

5 Israel



ERICE 2016 PROGRAMME

11:15am 11:45am 1:00pm

	10:00am	11:15am	11:45am	1:00pm	3:00pm	4:15pm	5:30pm	6:00pm	7:30pm	0:00am
Wed. July 13 th	8:30-8:45 Introduction Energy: The Big Picture David Ginley	Critical materials for energy Roderick Eggert	Coffee break	Global warming CO ₂ Capture & sequestration Julio Friedmann	Lunch	Energy-Water- Sustainability Nexus Neal Armstrong	Open discussion with students on topics above	Coffee break	Poster session	Dinner + music/drink networking after 9 PM
Thur. July 14 th	Geothermal power Adele Manzella	Nuclear power generation now and in the future Friedrich Wagner	Coffee break	Physics and engineering of wind power systems Hermann Josef Wagner	Lunch	Photovoltaics I: Principle/materials/ Inorganics Abdelilah Slaoui	Photovoltaics II: organics/hybrids Alexander Colsmann	Coffee break	Poster session	Dinner + music/drink networking after 9 PM
Fri. July 15 th	Materials and energy genome William Tumas	Photosynthesis and Solar fuels David Cahen	Coffee break	Biofuel David Cahen	Lunch	Concentrated solar power: systems Robert Pitz-Paal	Concentrated Solar power: components and materials Abraham Kribus	Coffee break	Poster session	Dinner + music/drink networking after 9 PM
Sat. July 16 th	Fuel cells Ryan O'Hayre	Thermal storage Xavier Py	Coffee break	Electrical storage George Crabtree	Lunch	Team	Dinner + music/drink networking after 9 PM			
Sun. July 17 th	Thermoelectricity Anke Weidenkaff	Mechanical Chemical storage Robert Schlögl	Coffee break	Materials for Buildings Matthias Koebel	Lunch (take away)	Excursion + Dinner				
Mon. July 18 th	Energy and mobility. Jo Hermans	Power system and market integration of renewable energy Georg Erdmann	Coffee break	Smart grids David Ginley	Lunch	Team	Dinner + music/drink networking after 9 PM			
Tue. July 19 th	Presentations b	y student teams	Coffee break	Presentations by student teams	Lunch	Free Afternoon				Social Dinner + Prizes

International School for Materials for Energy and Sustainability (ISMES VI)

July 16-22, 2017

California Institute of Technology

Pasadena, CA



2017 Lecturers

ISMES VI included lectures by world class experts in a broad set of renewable energy to manufacturing.

ISMES VI lectuers were:

- · Harry Atwater, California Institute of Technology
- · Sally Benson, Stanford University
- David Cahen, Weitzmann Institute for Science
- Yi Cui, Stanford University
- · Rod Eggert, Colorado School of Mines
- Chris Gearhart, National Renewable Energy Laboratory
- David Ginley, National Renewable Energy Laboratory
- Sossina Haile, Northwestern University
- Christiana Honsberg, Arizona State University
- Mark Jensen, Colorado School of Mines
- Martin Keller, National Renewable Energy Laboratory
- Steven Low, California Institute of Technology
- Ryan O'Hayre, Colorado School of Mines
- Carol Olson, Energy Research Center of the Netherlands
- · Antonio Terrasi, University of Catania
- Bill Tumas, National Renewable Energy Laboratory
- Mike Woodhouse, National Renewable Energy Laboratory
- Eli Yablonovitch, University of California, Berkeley
- Neil Fromer, California Institute of Technology





International School of Materials for Sustainable Development & Energy - 1st Course

Erice (Italy), July 7th – 12th 2018

Materials for Energy and Sustainability VII (ISMES VII)

School Directors



Antonio Terrasi



David Cahen



David Ginley



Anke Weidenkaff



Abdelilah Slaoui

Sponsors e Supporters























Places and locations











PROGRAMME

ERICE 2018 SCHOOL SCHEDULE: Arrival July 6th, Departure 13th

	8:45	10:00	11:15	11:45	13:00	15:00	16:15	17:30		:00	19:30
	10:00	11:15	11:45	13:00	15:00	16:15	17:30	18:00	19	:30	24:00
Sat. July 7 th	8:30-8:45 Introduction Energy Climate and Sustainability S. Benson	Energy Water Food Nexus D. Ginley	Coffee break	Approaches to CO ₂ Mitigation S. Benson	Lunch	15:00 15:45 Critical Materials D. Ginley	15:45 16:45 1. Exercises 2. Discussion on Energy questions	16:45 17:15 Coffee Break	17:15 18:00 Circular Economy Life cycle analysis D. Ginley	18:15 19:00 Get together Team formation	Dinner + Marsala room
Sun. July 8 th	PV Overview technologies D. Ginley	Nuclear Energy and Fusion F. Wagner	Coffee break	Wind Power Systems H.J. Wagner	Lunch	Energy Storage batteries R. O' Hayre	Energy-efficient transport and its future J. Hermans	Coffee Break			Dinner + Marsala room
Mon. July 9 th	Solar Fuels A. Weidenkaff	Biofuel Biomass I D. Cahen	Coffee break	Biofuel Biomass II D. Cahen	Lunch	Thermal Energy Conversion A. Weidenkaff	ergy Fuel Cells Coffee Poster session ersion R. O' Hayre break				Dinner + Marsala room
Tue. July 10 th	Materials by Design for Energy Applications W. Tumas	Energy Efficiency and the Grid P. Birkner	Coffee break	Health Issues and air pollution F. Forastiere		Lunch (take away) EXCURSION					
Wed. July 11 th	High efficiency low energy cost Si-HJ photovoltaic modules C. Gerardi	Emerging Trends for 21st Energy Technologies S. Sartori	Coffee break	Teams work on Presentation	Lunch	Teams work on Presentation					
Thur. July 12 th						15:00-16:00 Antonio Cammisecra ENEL Green Power CEO		16:00-19: Team tal			Gala Dinner



Many topics covered

Materials science and technology applied to the generation, storage, and use of green energy sources for sustainable development.

Global warming, CO₂ sequestration, water-energy, nuclear energy, solar thermal and photovoltaic power, photosynthesis and biofuels, fuel cells, wind energy, thermoelectricity, energy storage, electrical grid, and mobility/transportation.



25 hours of lectures
2 poster sessions
Student Teamwork
Excursion







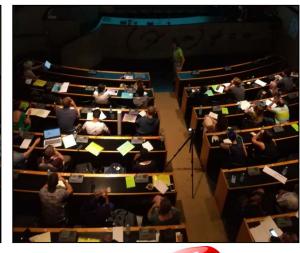


How we manage *LECTURES AND STUDENTS*

Every day seats were randomly assigned to the students to increase their interactions and to avoid the formation of small groups based on native language or scientific background

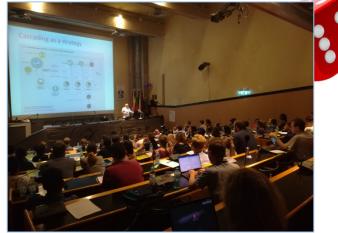






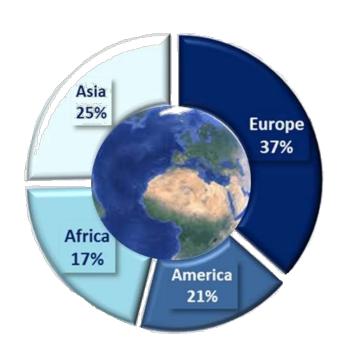


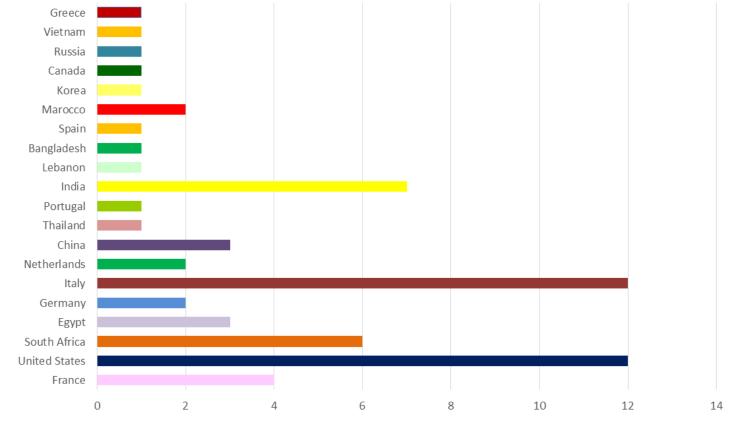






Who attended ??: 63 STUDENT FROM 20 DIFFERENT COUNTRIES































POSTER SESSIONS: 52 POSTER PRESENTED











83% of students presented the results of their scientific research

STRONG SCIENTIFIC INTERACTION AMONG STUDENTS





FINAL AWARD CEREMONY

















International School for Materials for Energy and Sustainability (ISMES VIII)

ISMES VIII

July 21-27, 2019

California Institute of Technology

Pasadena, CA



Topics

ISMES VIII will present a broad perspective of the inte

- Energy, Climate, and Sustainability
- Water, Food, and Materials
- Photovoltaics
- Solar Fuels
- Battery Energy Storage Technology
- Nuclear Energy and Fusion
- Deep Decarbonization
- Techno-economic Analysis
- Materials Recycling and Resource Strategies
- Hydrogen and Renewable Energy Storage
- Life Cycle Analysis
- Biofuels

Confirmed lecturers include:

- Harry Atwater, California Institute of Technology
- Sally Benson, Stanford University
- Adam Bratis, National Renewable Energy Laboratory (NREL)
- David Cahen, Weizmann Institute for Science
- Yi Cui, Stanford University
- Rod Eggert, Colorado School of Mines
- David Ginley, National Renewable Energy Laboratory (NREL)
- Kelsey Horowitz, National Renewable Energy Laboratory (NREL)
- Mark Jensen, Colorado School of Mines
- Audrey Lee, Sunrun
- Franklin M. ("Lynn") Orr, Jr., Stanford University
- Mary Ann Piette, Lawrence Berkeley National Laboratory
- Albert Polman, AMOLF
- Morgan Putnam, REsurety, Inc
- Sabrina Sartori, University of Oslo
- Paul Veers, National Renewable Energy Laboratory (NREL)
- Anke Weidenkaff, Fraunhofer ISC

ISMES – IX Sept. 4-9 2022, University of Catania



ISMES IX in Numbers

Catania September 5th - 9th

Organizers: MRS & E-MRS

Sponsors: University of Catania, EUREC, Enel Green Power

- 39 students from 9 Countries
- 10 Speakers (Italy, USA, Germany, Sweden).
- 3 Speakers from Industry
- 16 h of lectures
- 4 h of poster session
- 2 h of practical session (H2 production and batteries)
- 1 h exercises
- 10 h of independent work by 8 student teams with a final challenge presentation.
- 2h of guided tour at Enel Green Power Innovation Hub&Lab
- TOPICS:
 - (a) Energy as a global challenge
 - (b) Geothermal heat: conversion and storage
 - (c) Critical Materials
 - (d) Circular and sustainable materials
 - (e) Energy transformation (wind, biofuels, transportation)
 - (f) The Terawatt Challenge (PV)
 - (g) Nuclear Energy: fission and fusion
 - (h) Batteries
 - (i) Electrification
 - (j) Solar fuels, Green H2
 - (k) Fuel Cells











International School of Materials for Sustainable Development & Energy

Materials for Energy and Sustainability -X











European Materials Research



International School for Materials for Energy and Sustainability - ISMES 2024

June 10-15, 2024

Colorado School of Mines Golden, Colorado





	7:00 8:00	8:00 9:15	9:15 10:30	10:30 11:00	11:00 12:15	12:15 13:00	13:15 14:30	14:30 15:45		15:45 17:00				
Mon. 10 th	Breakfast	Peter Green Challenges to Sustainability (NREL)	David Ginley Electrification of everything (NREL)	Coffee break	David Cahen Biofuels Weizmann Inst	Lunch	Bob Clark-Phelps Industrial PV (First Solar)	Brainstorming on today's lectures		Coffee Break during poster session				
Tues. 11 th	Breakfast	Andrea Ambrosini High Temp. Solar Fuels (Sandia)	Eric Payne Technology Transfer (NREL)	Coffee break	Peter Birkner Transformation of Energy Systems (House of Energy e.V.)	Lunch	Ariel Furst Carbon Sequestration/ CO ₂ Chemistry (MIT)	Kandler Smith Batteries (NREL)	Coffee Break	Brainstorming on today's lectures	Dinner + Student Union			
	7:00 8:00	8:00 9:00		9:00 12:15		12:15 13:00	13:15 14:30	14:30 15:45	17:00 18:30					
Wed. 12 th	Breakfast	Jeff King Nuclear (CSM)		Center Re ed Rocks	eactor Tour/ Tour	Lunch	Hanno Erythropel Green Chemistry (Yale U.)	Ryan O'Hayre Fuel cells and electrolysis (CSM)	Coffee Break	Brainstorming on today's lectures	Dinner + Student Union			
	7:00 8:00	8:00 9:15	9:15 10:30	10:30 11:00	11:00 12:15	12:15 13:00	13:15 14:30		17:00 18:30					
Thur. 13 th	Breakfast	Richard Boardman Green Hydrogen (PNNL)	Daniel Laird Wind Power and Integration (NREL)	Coffee break	Rod Eggert Critical Materials (CSM)		EXCURSION (SACK LUNCH ON BUS) + DINNER							
Fri. 14 th	Breakfast	Robert Allen Chemistry from carbon sequestration to recycling (NREL)	Julien Walzberg Modeling Energy Systems (NREL)	Coffee break	Roundtable on big data and its energy requirements	Lunch	Exercise Solutions & Assign. of team presentations (15-16:00)	Teams wo	Dinner + Student Union					
Sat. 15 th	Breakfast	Tea	ms work on l	Presenta	ations	Lunch	Tea	am talks and l	Evaluati	ion	Gala Dinner			