



Fourth International Symposium on
**ENERGY CHALLENGES
& MECHANICS**
Working on Small Scales

Photographer: Volker Mai

Conference Guide

Hilton Aberdeen Treetops, 161 Springfield Road
Aberdeen, AB15 7AQ, Scotland, United Kingdom

10 - 13 August 2015

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WELCOME FROM THE CHAIR

Distinguished Delegates,

Welcome to Aberdeen, the Energy Capital of Europe! Since James Watt, a Scottish inventor, improved the efficiency of steam engine, human civilization relies more and more on a steady energy supply.

Today, the world is poised on the brink of two historic energy transformations: replacing oil with electricity in transportation, and replacing high carbon, finite-supply coal and natural gas with renewable wind, solar, marine and biomass energies for electricity production. This symposium explores the current, state-of-the-art small scale technologies being applied to solve energy challenges worldwide.

Welcome to ISECM 2015! We wish you a fruitful 3-days of learning, discussions and networking.



Best Regards,

Dr. Henry Tan, Conference Chair
University of Aberdeen

IMPORTANT POINTS

Venue Info & Local Area

Venue Address: Hilton Aberdeen Treetops
161 Springfield Road, Aberdeen, AB15 7AQ
Tel: 01224 313377

A useful website for local information on Aberdeen city centre is <http://www.visitaberdeen.com/>

Transport

By Taxi:

Rainbow - 01224 87 87 87 or 01224 49 49 49
ComCab - 01224 35 35 35
Aberdeen Taxis - 01224 68 68 68

By Bus:

The No 5 bus stops outside the front of the hotel on the main road and connects in the city centre. An adult day ticket is £4.00 and an adult evening ticket is £3.00. Further details including timetables can be found at www.firstgroup.com

Conference Attire

All attendees are asked to wear business casual attire for the duration of the conference.

Identification

All delegates must wear their lanyard name badge at all times. Your badge is your ticket and therefore gives you access to all sessions, lunch catering and the social programme. Badges are strictly non-transferable. Please ensure you keep these safe. If you cannot provide a badge or identification to verify your booking then you may be asked to leave the event.

Certificate Of Attendance

All delegates had the opportunity to request a certificate during the online booking process (see your registration packet). If you did not request a certificate during booking, an electronic version can be sent to you following the conference. Please notify the organisers at the Information Desk if you will require an electronic certificate.

Session Etiquette

Speakers: During the 20 minute break before your session slot, find your presentation room and upload your presentation files to the provided laptop. **Please ensure that you remain within**

CONFERENCE SCHEDULE

PRE-REGISTRATION

Monday, 10 Aug 2015

PRE-REGISTRATION

19:00 - 21:00

Beechwood Suite

Come at any time to collect
your badge and delegate pack

DAY 1

Tuesday, 11 Aug 2015

REGISTRATION

8:00 - 9:00

Beechwood Suite

WELCOME REMARKS

9:00 - 9:25

OPENING LECTURE

9:25 - 10:15

Cedar Suite

MORNING BREAK

20 minutes

PARALLEL A

10:35 - 12:20

LUNCH

12:30 - 13:30

Accompanying persons
are not catered for

PARALLEL B

13:40 - 15:25

AFTERNOON BREAK

20 minutes

PARALLEL C

15:45 - 17:30

WELCOME RECEPTION

17:30 - 19:30

Cedar Suite

For all Participants

A1 POSTER SESSION

18:30-19:30

Partition wall between
Cedar and Sycamore Suite

DAY 2

Wednesday, 12 Aug 2015

PRINCIPAL LECTURE

8:30 - 9:20

Beechwood Suite

Sycamore Suite

MORNING BREAK

20 minutes

PARALLEL D

9:40 - 11:25

LUNCH

11:30 - 12:30

Accompanying persons
are not catered for

A TRADITIONAL SCOTTISH OUTING

12:30 - 17:15

Whisky tasting and Tours
at Glamis Castle

18:30

ISECM 2015 Group Photo

19:00 - 21:30

Conference Dinner
at Aberdeen's Beach Ballroom

Stage Performance by Andrew
McTaggart Sandra Hawkins

Transportation from and
to the Hilton Treetops hotel
will be provided. Coach will depart
from Beach Ballroom at 21:30

DAY 3

Thursday, 13 Aug 2015

PARALLEL E

8:30 - 10:15

MORNING BREAK

20 minutes

PARALLEL F

10:35 - 12:20

LUNCH

12:30 - 13:30

Accompanying persons
are not catered for

PARALLEL G

13:40 - 15:25

AFTERNOON BREAK

20 minutes

CLOSING LECTURE

15:45 - 16:35

CLOSING COMMENTS

16:35 - 16:45

Sycamore Suite

your timeslot for your presentation and Q&A. It is essential that the conference runs on time.

Moderators: Please arrive for your session at least 5 minutes in advance so you are prepared and ready to begin the session on time.

Audience members: Please note that the use of photography during presentations is strictly forbidden. **It is unethical to take photographs without consent of a speaker** (you may be asked to delete images). Please respect the speakers and limit your photos to before/after the talks.

Slide Copyright: All slides presented at ISECM 2015 are the sole property of each speaker and cannot be copied or redistributed without permission.

Computer Instruction & Guidance

Each conference room is equipped with a laptop, projector, and clicker for controlling the PowerPoint presentations. Login information has been written on each laptop (this will allow you to access the guest account set up for this conference).

(1) To access the Microsoft suite, press the windows key (lower left on the keyboard). A start menu will appear where you can click the program you need.

Each laptop/projector will be pre-set to the “extend” display setting. This means the laptop will function as one screen and the projector will function as another. When you open a **PowerPoint presentation**, it will only appear on the laptop screen. **(2a) View the presentation in full screen mode in order to utilize both screens.** Choose full screen mode within the slideshow menu or by pressing the F5 key on the keyboard.

If you are using an **(2b) Adobe PDF presentation, move the whole PDF window onto the 2nd screen**, which is the projector. This is done by clicking and holding onto the title bar of the window and dragging it to the right until it appears onto the projector screen.

Please Note:

- *Our computers are not connected to the Internet and are unable to do so during presentations.*
- *All presentations and data left on the Laptops after each day WILL be erased from the computer. However we strongly encourage all delegates to erase all data and material themselves.*

Photography Consent

There will be an official photographer during the conference. If you do not wish your photograph to be taken, please notify the organisers at the Information Table.

Smoking Policy

It is forbidden to smoke inside anywhere inside a building in the UK so please smoke outside at a good distance from the hotel entrance and make use of disposal areas for cigarettes.

SCHEDULE OVERVIEW

Opening Remarks & Lecture

The ISECM opening remarks will be delivered by Dr. Henry Tan and in the Cedar Suite at 9:00. Robert Collier (Chief Executive of Aberdeen & Grampian Chamber of Commerce) will then introduce Professor Alexei A Kornyshev's Opening Lecture.



Lunch

A lunch buffet will be served each day for all ISECM delegates in either the Reception Foyer, Sycamore Lounge or the Springfield Restaurant. You will receive a lunch ticket that tells you which area to use – please ensure you retain this ticket for all 3 days. There is no allocated seating within each area, please just find a seat and enjoy your lunch. Do note that lunch is not provided for accompanying persons.

Welcome Reception

We will welcome you with a reception on the first evening where you can relax and network with your fellow delegates. Light refreshments, canapés, tea and coffee will be provided alongside a cash bar for additional beverages. All delegates are invited to attend, along with accompanying persons.

A1 Poster Session

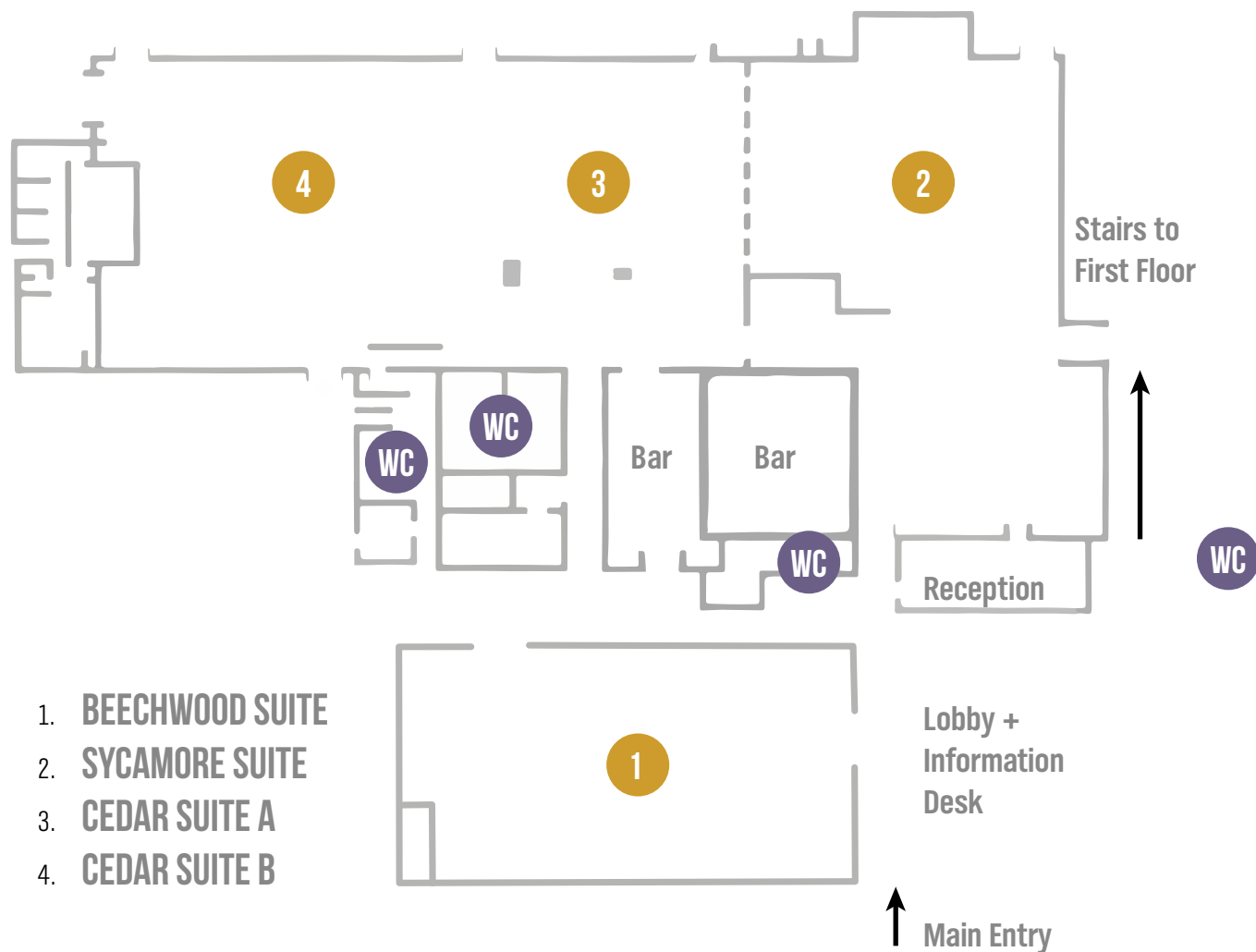
A poster session will take place on the partition wall between the Cedar and Sycamore suite on Day 1 from 18:30-19:30 during the welcome reception. Please take the opportunity to view these as part of your evening.

Delegate Reimbursements

All reimbursements will be processed from 14:00 - 17:00 on Day 1 at the Information Table.

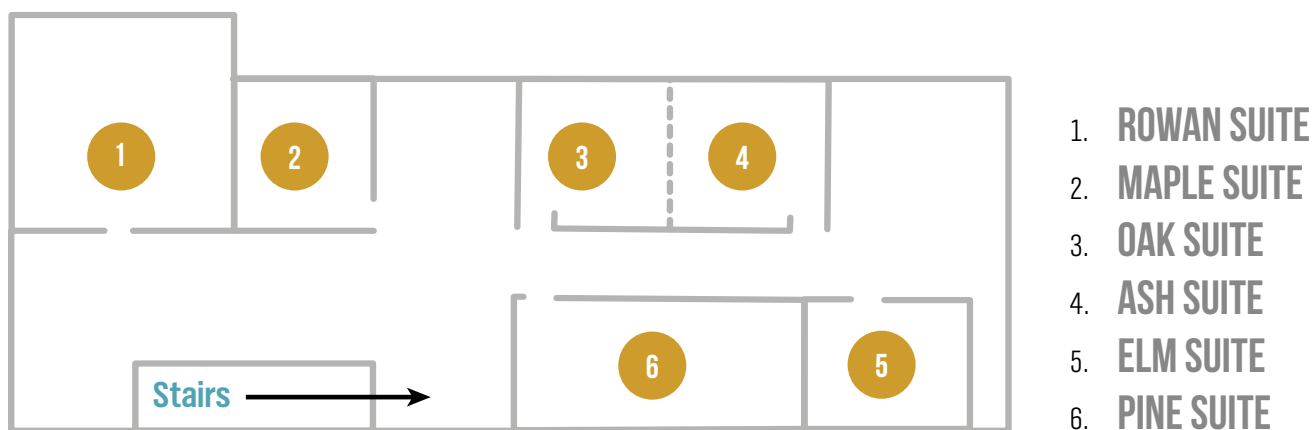
VENUE MAP

Ground floor



VENUE MAP

First floor



Principal Lectures

Two Principal Lectures will be delivered simultaneously at 8:30 on Day 2. Delegates should select one of the two lectures to attend.

Social Programme

You will be transported by coach for the tour and dinner on Day 2. Coaches will depart from the car park at 12:30, so please ensure you are on time.

Official ISECM 2015 Photo

Please note that the official ISECM 2015 photo will be taken at 18:30 in front of the Beach Ballroom Aberdeen on Day 2 for all who wish to join.

Closing Lecture & Remarks

Prof. Ken Reifsnider will deliver the closing lecture on Day 3 in the Sycamore Suite, followed by closing remarks by Dr. Henry Tan.

SOCIAL PROGRAMME

Departure

For delegates attending the social programme, **please meet in the car park at 12:30** to board the coaches. We will be departing at 12:45 sharp so please do not be late. **Your badge is your ticket** and must be worn at all times during the conference and social programme.

If you are unwell and/or unable to attend this part of the conference, please notify the organisers at the Information Table.



Castle Tour: Glamis Castle

Glamis is a fairytale castle and has been the home of the Earls of Strathmore and Kinghorne for over 630 years. It's most famous resident is the lady we all knew as the Queen Mother. Glamis was

the place she called home throughout her entire life and the place she returned to, visiting the Royal Apartments, time and time again.

Your tour will take you through the castle's 10 public rooms and gives you an intimate snapshot of how this family has contributed to the history of Scotland. Every room is different and has a story to tell. From Mary Queen of Scots to the G8 conference in 2005, Glamis has welcomed royalty and world leaders through its massive oak studded front door. Famed as the most haunted castle in Scotland, ghost stories abound.

Meet in the car park at 17:15 for transport to the conference dinner. Coaches will depart promptly at 17:30.



Conference Dinner: Beach Ballroom, Aberdeen

The Beach Ballroom is an Art Deco building on the sea front of Aberdeen, Scotland. It is home to one of Scotland's finest dance floors - famous for its bounce - which floats on fixed steel springs. It was built in 1926, and is a Category B listed building.

During the evening we will experience a performance by singers Andrew McTaggart and Sandra Hawkins. Gerunds and colleagues, they have been singing together for many years. Both studied at the Royal Conservatory of Scotland, have been heard on BBC Radio 3 and have performed in venues including Edinburgh's Usher Hall, The Royal Albert Hall and various concert tours throughout Scotland. Over the last 10 years, they have performed in concerts in Glasgow, raising over £45k for charities. They perform a wide range of repertoire from Classical, Opera to songs from the shows.



The welcome on the evening will be delivered by Cllr. Barney Crockett from Aberdeen City Council.



OPENING PLENARY LECTURE

11 Aug 2015, 9:25 - 10:15, Cedar Suite



The Essential Physics of Supercapacitors & Electroactuators at the Nanoscale: Electricity vs Mechanics

Professor Alexei A Kornyshev FRSC

Professor of Chemical Physics
Department of Chemistry, Imperial College London, United Kingdom

This lecture will discuss the science behind one of the hot and rapidly developing areas of energy harvesting and storage: electrolytic supercapacitors and electroactuators using ionic liquids aselectrolytes.

PRINCIPAL LECTURES



12 Aug 2015, 8:30 - 9:20, Sycamore Suite

New Inspirations from Nature: Picotechnology

Professor Thomas J. Webster

Department of Chemical Engineering, Northeastern University, United States
Center of Excellence for Advanced Materials Research King Abdulaziz University, Saudi Arabia

The inspiration for the use of nanotechnology across all scientific disciplines comes from nature, which enables the production of materials with unique features. Biological systems clearly work at the nanoscale, from cellular interactions to intracellular events. This talk will summarize some of the more exciting advances in picotechnology in medicine, an emerging field called picomedicine.



12 Aug 2015, 8:30 - 9:20, Beechwood Suite

Energy Harvesting using ZnO-Based Thin Films & Nanostructures

Dr. David Rogers

CTO, Nanovation, France

ZnO has become a hot topic because of its' distinctive property set plus a number of recent breakthroughs which predispose it for use in a whole range of energy harvesting applications from solar cells, through nanowire piezogenerators to thermoelectrics. In this talk, we will give an overview of these advances and present some of the wide range of ZnO-related devices and applications being researched at the moment with illustrations from the work of the French ZnO start-up, Nanovation (www.nanovation.com).

CLOSING PLENARY LECTURE

13 Aug 2015, 15:45-16:35, Sycamore Suite



Heterogeneous Nano-Material Design for Energy Conversion & Storage

Professor Ken Reifsnider

Presidential Distinguished Professor, University of Texas Arlington
Member of the U.S. National Academy of Engineering

Heterogeneous functional materials with functional void phases and surfaces are critical elements of many energy conversion and storage devices including batteries, fuel cells and flow batteries, separation membranes, and capacitive devices. Such materials are typically multifunctional, and their reaction with applied mechanical, electrical, and thermal fields is the subject of design for performance. [This session will] define the challenges and identify the best approaches to achieving an understanding, constructing models and analysis, and predicting behavior of such heterogeneous systems as a genre of materials.

Dinner Menu

Starter

Carrot & Coriander Soup
served with Balmoral Bread

Mains

Breast of Aberdeenshire Chicken
served with Apple and Ginger Sauce

Dauphinoise Potato

Baton Carrots

Wrapped Green Beans

Dessert

White Chocolate Cheesecake

Coffee & Mints

Return Journey

On the return journey around 21:30, the coaches will stop in the city centre before returning to the conference hotel.

ORGANISER & SCIENTIFIC COMMITTEE

Organiser

North Sea Conference & Journal Ltd
Aberdeen, Scotland, UK

Emergency Contact Number: +44 (0)7898 700203

Scientific Committee

Prof. Ken Reifsnider, USA

Prof. Teófilo Rojo, Spain

Prof. Wei Lu, USA

Prof. Xiaobo Ji, China

Prof. David Jenkins, USA

Prof. Rachel Yerushalmi-Rosen, Isreal

Prof. Kyle S Brinkman, USA

Prof. Huiling Duan, China

Prof. Yung Joon Jung, USA

Prof. Guang Feng, China

Prof. Veronica Barone, USA

Jakob Kuebler, Switzerland

Dr. Dan Credgington, UK

Prof. Ralf Rudwig, Germany

PROCEEDINGS

All presentation abstracts and speaker bios are available on our website:

<http://www.nscj.co.uk>

High quality papers will be selected for publication on the open access Journal of Energy Challenges and Mechanics:

<http://www.nscj.co.uk/JECM>

THANK YOU

To all the organisers, committee members, delegates, and vendors of the Fourth International Symposium on Energy Challenges and Mechanics: We thank you for your support! It is only through your dedication, commitment and tireless work that this conference could be a success.

SESSION TOPICS

The following topics are arranged into Parallel Sessions:

- 01:** Lithium Ion Batteries
- 02:** Photovoltaics
- 03:** Hydrogen Generation and Storage
- 04:** Beyond Lithium Ion Battery
- 05:** Graphene-based Nanotechnology for Energy Applications
- 06:** Thermoelectrics
- 07:** Nanotechnology for Generators
- 08:** Fuel cells
- 09:** Microelectronic Devices for Energy Efficiency
- 10:** Supercapacitors
- 11:** Nanomechanics
- 12:** Micromechanics
- 13:** Microorganisms for Energy Applications
- 14:** Porous Materials for Energy Applications
- 16:** Heterogeneous Nano-Material Design for Energy Conversion and Storage
- 17:** Energy Harvesting
- 18:** Mechanics of Nanoporous Materials for Energy Applications
- 20:** Crystal Growth and its Energy and Environmental Applications
- 21:** Energy Saving Techniques
- 23:** Thin Film Technology for Energy Applications
- 23:** Energy Impact of Superconductors
- 25:** Atomic Layer Deposition Technology
- 27:** Nano/micro Fluidics for Energy Applications

MY PLAN

Use this section to plan your participation at ISECM 2015. Note which sessions you wish to attend or keep track of new colleagues.

MY SESSION & LOCATION:

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MY SESSION PICKS:

PARALLEL	SESSION NUMBER	ROOM
A
B
C
D
E
F
G

MY NEW CONTACTS:

COLLEAGUE 1:

.....

COLLEAGUE 2:

.....

COLLEAGUE 3:

.....

COLLEAGUE 4:

.....

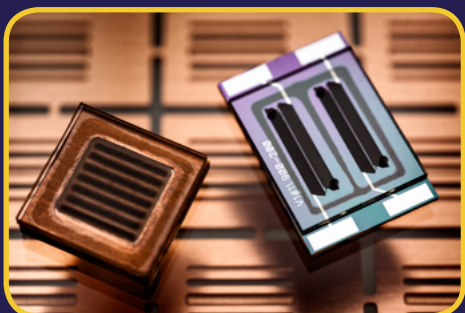
COLLEAGUE 5:

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COLLEAGUE 6:

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Handwriting practice lines consisting of 20 horizontal dotted lines.



Research Image Competition

Winner of the ISECM 4 Research Image Competition

Title: Lithium ion micro batteries with interdigitated electrodes (left: metal foil housing, right silicon housing) and glass lid.

Authors: Robert Hahn, Krystan Marquardt, Katrin Höppner, Marc Ferch

Fraunhofer IZM, Berlin

Photographer: Volker Mai