

REPORT RESEARCH ACTIVITIES

COLORADO - USA

JUNE 14-29, 2015



Prof.Dr. Evvy Kartini

National Nuclear Energy Agency (Batan), Indonesia

**The activities were supported by
The International Society of Solid State Ionics and
The Ministry Research and Technology
INDONESIA**

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USA, JUNE 14-29 2015

Prof. Dr. Evvy Kartini

National Nuclear Energy Agency (BATAN), Indonesia

In the frame of collaboration between Colorado School of Mines (CSM) and Indonesia National Nuclear Energy Agency (BATAN), Prof. Evvy Kartini has performed international joint research in USA, and attended the 20th International Conference on Solid State Ionics, from June 14-29, 2015. These activities were supported by the Ministry Research and Technology, Indonesia and the International Society of Solid State Ionics. There are several activities, performed during this visit and all these activities are summarized as follow :

1. International Conference on Solid State Ionics, Keystone, Colorado, USA

The 20th International Conference on Solid State Ionics was held in International Conference Center, Keystone, USA. Two papers were presented at the conference. As one of the Executive Committees of the International Society of Solid State Ionics, where Prof. Evvy Kartini represented as Councilor of Asia and Australia region, she has attended the International board meetings during this conference. Detail on the conference will be reported separately.

2. International Joint Research with Department of Chemistry, Colorado school of Mines, Golen, USA

Based on similar interest on battery research, Prof. Evvy Kartini was also invited to perform collaboration with Prof. Youngan Yang, from the Chemistry Department, of Colorado School of Mines, Golden, USA. The discussion on the research progress at both laboratories was held, at Coolbaugh Hall, Chemistry Building, 5th Street, Golden. Interactive discussions with the students and presentation to the group were conducted. There was a wish to further conduct the collaboration in the future by preparing LoI between these institutions.

3. International Joint Research with Department of Engineering, Colorado school of Mines, Golen, USA

By the invitation from Prof. Dr. Ryan O’Hayre, from Department of Engineering, Colorado School of Mines (CSM), Golden, Prof. Evvy Kartini could have a chance to visit the laboratory of Advanced Materials Research at CSM at Hill Hall, 7th Street, Golden. The main interest on the research was developing new ceramic materials for the Solid Oxide Fuel Cell.

All these activities will be reported separately in more detail.

We greatly acknowledged for the support from the Ministry Research and Technology, to perform collaboration and from the International Society of Solid State Ionics to attend the 20th International Conference on Solid State Ionics. We expect that this international collaboration, and international networking will bring mutual benefits to all parties. The international collaborations on the solid state ionics field, especially on advanced materials for energy storage (fuel cell, battery etc) by using different techniques, including nuclear technique could be realized, and hopefully will be continue in the near future.

Serpong, July 1, 2015

Prof. Dr. Evvy Kartini

20th International Conference on Solid State Ionics

Keystone, USA

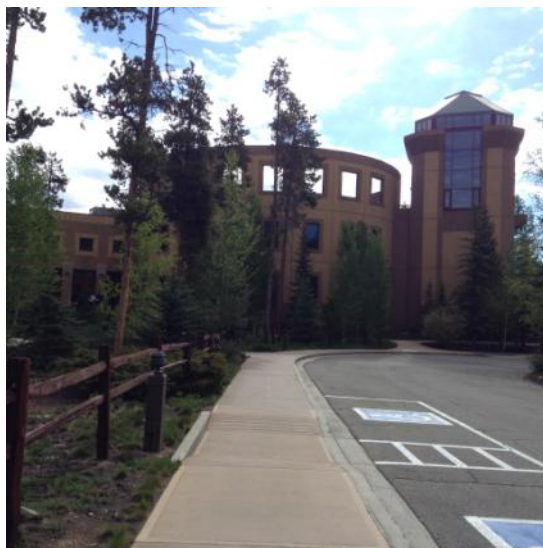
Prof.Dr. Evvy Kartini

Councilor of Asia-Australia Region



Prof.Dr.Evvy Kartini
Concilor Asia Australia Region
International Society of Solid State Ionics

The 20th International Conference on SSI was held at the Keystone International Conference Center from June 14-19, 2015. The registration and welcome reception was held on June 14, 2013 at the same place. The conference was organized by the International Society of Solid State Ionics, USA local Organizer, chaired by Prof.Sangtae Kim from University California Davis USA. It was opened by the President of ISSSI, Prof. Joachim Maier from Germany. In his brief report, the conference was attended by more than 600 participants from all over the world (~more than 54 countries).



International Conference Center, Keystone, Colorado, USA

20th International Conference on Solid State Ionics


June 14-19, 2015

Keystone Resort & Conference Center
Keystone, Colorado

The 20th International Conference on Solid State Ionics (SSI-20) was held in Keystone, Colorado. The Conference provided essential information on the breadth and depth of current solid state ionics research worldwide.




This year's Conference featured a combination of plenary, keynote, invited and contributed talks, poster sessions and tutorials.



20th International Conference on Solid State Ionics

June 14-19, 2015 | KEYSTONE RESORT & CONFERENCE CENTER
KEYSTONE, COLORADO, USA



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Committees


Chief Organizer
Sangtae Kim, University of California, Davis, USA

Co-Organizers
William Chueh, Stanford University, USA
Joachim Maier, Max Planck Institute for Solid State Research, Germany (ISSI President)
Ryan O'Hayre, Colorado School of Mines, USA


Local Organizing Committee
Scott Barnett, Northwestern University, USA
Shannon Boettcher, University of Oregon, USA
Yi Cui, Stanford University, USA
David Ginley, National Renewable Energy Laboratory, USA
Sossina Haile, Northwestern University, USA
Andrew Herring, Colorado School of Mines, USA
Joshua Hertz, University of Delaware, USA
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John Turner, National Renewable Energy Laboratory, USA
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Conference Hall



Opening Ceremony



Plenary & Keynote Speakers

Special Plenary Speaker

[John B. Goodenough](#), University of Texas at Austin, USA

John B. Goodenough



John B. Goodenough, University of Texas at Austin

After receiving a Ph.D. in physics in 1952, John B. Goodenough was a group leader at the MIT Lincoln Laboratory where he helped to develop the ferrimagnetic spinels used in the first RAM memory of the digital computer. In the course of this work, he identified structural transitions caused by cooperative orbital ordering and he developed the rules for the sign of the interatomic spin-spin magnetic interactions. In the subsequent decade, Goodenough explored the magnetic and transport properties of transition-metal compounds, including the transition from localized to itinerant electron behavior where strong electron-lattice interactions give rise to static or dynamic charge-density waves. These studies were summarized in his two books *Magnetism and the Chemical Bond* and *Les oxydes des métaux de transition*, translated from his long review titled *Metallic Oxides*.

With the first oil crisis in the early 1970s, Goodenough turned to the study of energy materials. Called in 1976 to head the Inorganic Chemistry Laboratory of the University of Oxford, UK, he developed in England the layered $\text{Li}_{1-x}\text{CoO}_2$ for the cathode of a rechargeable Li-ion battery; it was used in the battery of the first cell telephone marketed by the SONY Corporation that launched the wireless revolution. Goodenough subsequently identified two other transition-metal oxide structures, spinel and ordered olivine, as potential cathodes material; that are also used as cathodes in commercial Li-ion batteries. In 1986, Goodenough took the Virginia H. Cockrell Centennial Chair of Engineering at the University of Texas at Austin where he has returned to his fundamental studies of transition-metal oxides and their use as electrodes of Li-ion batteries and the solid-oxide fuel cell.

Plenary Speakers

[Sossina M. Haile](#), Northwestern University, USA

[Joachim Heberle](#), Free University of Berlin, Germany

[Juergen Janek](#), Justus Liebig University Giessen, Germany

[Shu Yamaguchi](#), University of Tokyo, Japan



Prof. J.B. Goodenough (Texas) and Prof. Selvasekarapandian (India)



Prof. S Kim, and Prof. R. O'Hayre with the Poster Award winners



Poster presentation from Indonesia, by E.Kartini, Wagiyo and Ade Saputra.



April 27, 2015

Prof. Dr. Evvy Kartinni, Chief Scientist
Science and Technology Center for Advanced Materials
National Nuclear Energy Agency, Indonesia
Puspiptek Serpong, Tangerang Selatan 15314
Indonesia

You are invited to attend the 20th International Conference on Solid State Ionics, held from June 14-19, 2015 at the Keystone Resort & Conference Center in Keystone, Colorado.

Presentation information

CONTROL ID: 2225483

TITLE: [Assembly and Electrochemical Properties of LiFePO₄/C Pouch Cell](#)

CONTACT (NAME ONLY): [Evvy Kartini](#)

AUTHORS/INSTITUTIONS: E. Kartini, W. Honggowiranto, Science and Technology Center for Advanced Materials, National Nuclear Energy Agency, South Tangerang, Banten, INDONESIA

ABSTRACT FINAL ID: C2.49

SESSION DAY & DATE: Monday, June 15, 2015

SESSION ABSTRACT START TIME: 12:00 PM

SESSION LOCATION: Keystone Resorts, Red Cloud Peak

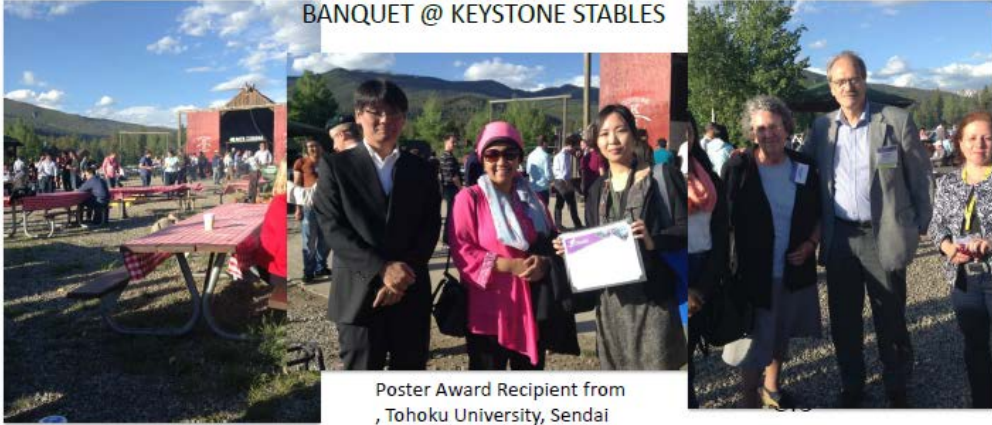
The 20th International Conference on Solid State Ionics (SSI-20) will provide essential information on the breadth and depth of current solid state ionics research worldwide. This year's conference will feature a combination of plenary, keynote, invited and contributed talks, poster sessions, and tutorials. Topics include Fuel Cells & Electrolyzers; Batteries & Supercapacitors; Photoelectrochemistry and Solar Fuels; Permeation Membranes; Solid State Memory, Switches & Sensors; and Fundamentals of Transport and Reactivities.

For more information on the conference, please check the website at <http://www.mrs.org/ssi-20/>. We look forward to seeing you at the conference and trust it will prove to be a scientifically stimulating experience for you and your international colleagues.

Sincerely,

Jacqueline Manchas, CMP, Senior Meeting Services Manager
Materials Research Society®
506 Keystone Drive
Warrendale, PA 15086
Phone: 724-779-2722; Fax: 724-779-4397

BANQUET @ KEYSTONE STABLES



Poster Award Recipient from
, Tohoku University, Sendai



The local organizers & President ISSI

The Banquet was held on Wednesday afternoon, at the Keystone Stables.



The International board meeting of the executive committee International Society of Solid State Ionics was held at Board Room, Conference Center, Keystone on Monday 15, 2015 and Thursday 18 June 2015. Most of the board attended the meeting. Several points were discussed at this meeting, including YSA votes, Sites votes for the next conference, several regulations about the election, organization and the ISSI budget, etc. The activities in the region were also encouraged to be conducted, such as workshop or regional conference. ISSI would like to support this kind of activities, like the one was held in Indonesia in 2014.

Closing Ceremony

The president of ISSI announced the finalist of Young Scientist Awards, and he gave also a medal for the best young scientist. It is important to keep the young generation on this field to grow and find their existences.

YOUNG SCIENTIST AWARD FINALISTS



Local Organizers

Prof. Joachim Maier thank also to the organizer, for the effort and such a great Conference in Keystone.



President of the International Society of Solid State Ionics Prof. Joachim Maier (MPI, Germany) Was given the mandate to the President elected Prof. Harry Tuller (MIT, USA)

Before end, President ISSI , Joachim Maier gave the mandate to the elected President Prof. Harry Tuller from MIT, USA, to take the duty as President ISSI from 2015-2017.

Finally, announcement of the coming 21st International Conference on Solid State Ionics, was done by Prof. De Novito from Padua Italy.



Announcement of the coming 21st ICSSI in Padua Italy

International Collaboration



JOINT RESEARCH CSM , COLORADO AND BATAN, INDONESIA

E.Kartini¹, Ryan O'Hayre², Yongan Yang³

¹Technology Center for Nuclear Industry Materials, National Nuclear Energy Agency (BATAN), Indonesia

²Mettalurgical and Material Engineering, Colorado School of Mines, Golden, Colorado, USA

³Chemistry Department, Colorado School of Mines, Golden, USA



COLORADO SCHOOL OF MINES
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Professor Ryan O'Hayre
George S. Ansell Department of
Metallurgical and Materials Engineering
1500 Illinois Street,
Golden, Colorado 80401-1887
Office: 303-273-3592
Fax: 303-273-3057

Prof. Dr. Evvy Kartini
Chief Scientist
Science and Technology Center for Advanced Materials
National Nuclear Energy Agency (BATAN),
Puspiptek Serpong, Tangerang 15431, Indonesia

Colorado, 14 April 2015

Subject: Invitation for Joint Collaboration on Battery Research at Colorado School of Mines, USA and International Conference on Solid State Ionics 2015, Keystone, Denver, USA, June 14-29, 2015

Dear Prof. Kartini,

We are pleased to invite you to perform joint collaboration on battery Research and Technology at Colorado School of Mines, USA, on the period from June 14 to 29, 2015. Colorado School of Mines is one of the top engineering schools in the United States at both the undergraduate and graduate level. Mines is a global leader in research and the advancement of technology. Our research spans many highly relevant areas with a specific focus on **energy and environmental stewardship**. Several of our faculty are deeply engaged in electrochemical energy conversion technology, including various international collaborations in the field of solid-state-ionics, particularly fuel cells, ion membranes, and battery research and technology.

In order to discuss the world progress on Solid state ionics, during this time, you are also invited to attend the 20th International Conference on Solid State Ionics, held from June 14-19, 2015 at the Keystone Resort & Conference Center in Keystone, Colorado. The 20th International Conference on Solid State Ionics (SSI-20) will provide essential information on the breadth and depth of current solid state ionics research worldwide.

The international board member of the International Society of Solid State Ionics (ISSI), will have annual meeting at this time. Since you are one of the councillors in Asia-Australia region, you are cordially invited to attend and present the progress on the Asia-Australia activities on this field. Your presence will give significant contribution to the community.

I hope you can accept our invitation to come to Colorado. Please do not hesitate to ask me for further questions.

Sincerely Yours,

Prof. Ryan O'Hayre
Metallurgical and Materials Engineering
Colorado School of Mines
1500 Illinois St.
Golden, CO. 80401

INTERNATIONAL COLLABORATION –DEPT.CHEMISTRY, CSM, COLORADO



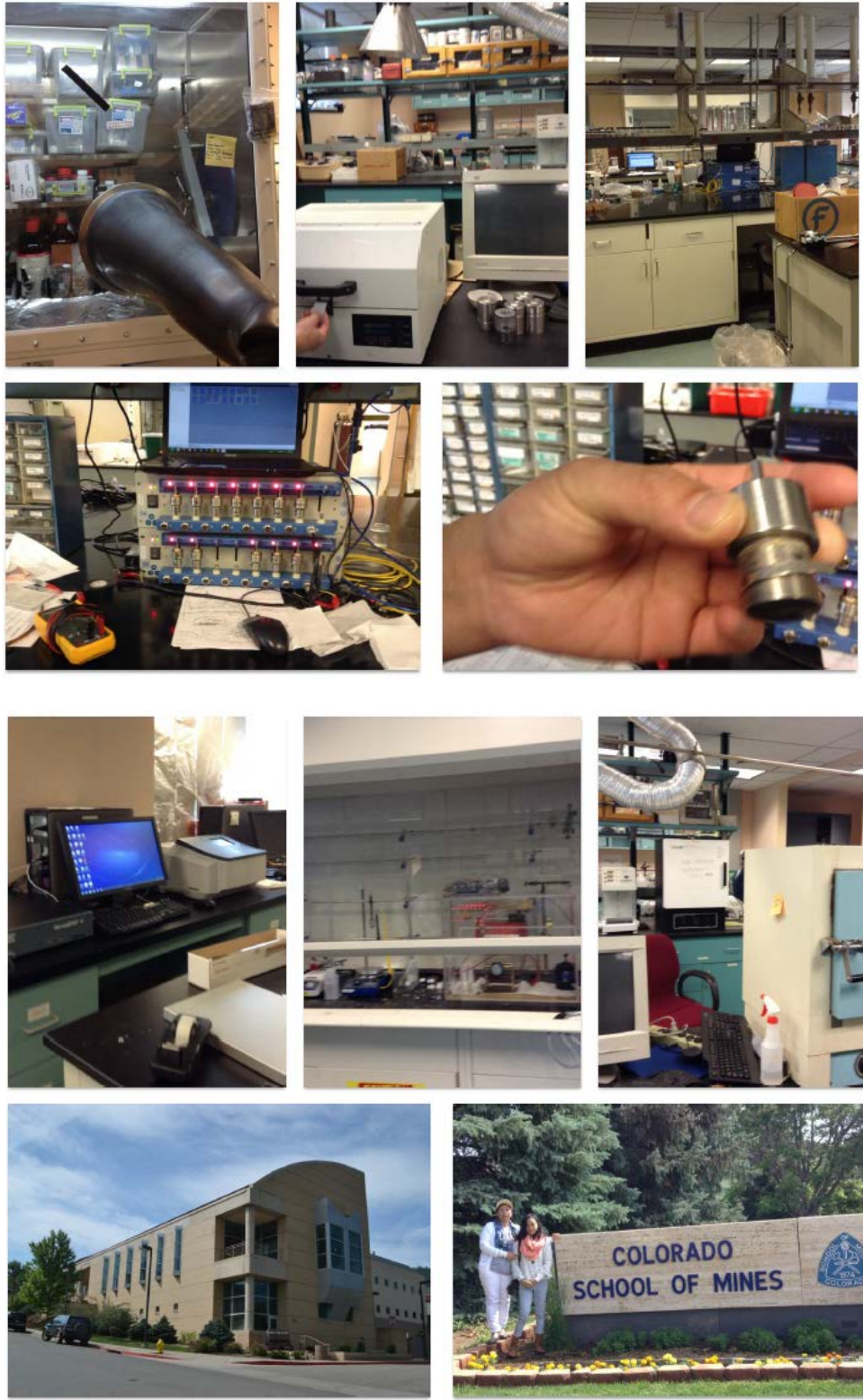
Prof. Evvy Kartini was invited to perform collaboration on battery research with Prof. Yongan Yang at the Dept. Chemistry, Colorado School of Mines, Golden, Colorado, USA. During the visit, she has given presentation on the research activity in Indonesia, and also discussed on the on going research at CSM. There were similar goal to develop new advanced materials for the battery materials, such as cathode, anode or electrolyte components. Similar activities will bring mutual benefits to both parties, for example by exchange scientists or students from both laboratories. This could be done in the near future. Prof. Yongan Yang also expressed his intention to continue the collaboration and perform further battery assembly with the facility in BATAN, Indonesia. Meanwhile from the Indonesian sides, the depth discussion and analysis of the materials by several techniques will be very interesting to be studied at CSM.



Prof. Yongan Yang with the students and kids, during visit at CSM.

The development of lithium phosphate with wet chemical reaction by using wasted chemical product would be the main interest of the research in BATAN. With the two fold goals, utilizing local resources and also optimizing the application for industry are the main activities in BATAN. The CSM is currently also developing some new cathode and anode materials for battery components with the abundant sources from surrounding areas, such as S and Si. Therefore, there are good combination of research in the future between BATAN and Colorado School of Mines.

About the facilities, the two laboratories have their own main interests, but mostly the basic instruments for sample preparation and battery assembly in the small scale (coin, swagelok) are the same. However, for further implementation in higher scale up, and real industry, the facilities in BATAN is most prepared. The Integrated battery laboratory in BATAN has three lines battery productions, namely coin, cylinder and pouch cells.



Battery Facilities at Dept. Chemistry, Colorado School of Mines, Golden, USA

INTERNATIONAL COLLABORATION –DEPT.METALLURGICAL AND MATERIAL ENGINEERING, COLORADO SCHOOL OF MINES, COLORADO

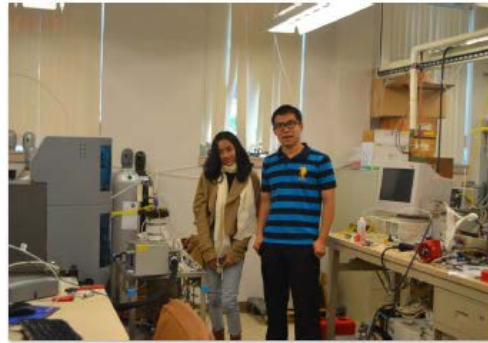
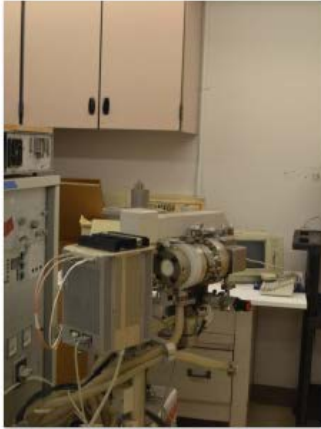


Prof. Evvy Kartini has also a chance to visit the laboratory of Renewable Energy, Metallurgical and Material Engineering, at Hill Hall, Colorado School of Mines, Golden, USA. The main interest of the research from Prof. Ryan O’Hayre group is to develop the new ceramic materials for energy storage materials that will be applied in Solid Oxide Fuel Cells (SOFC). The graduate student , Mr. Chuan Chang, has shown the facilities in the lab, including his current development of SOFC. The laboratory equipped with various instruments for electrochemistry experiments, high temperature sample preparation, thermo gravimetric, furnaces, etc. The most interesting, was the electrochemistry instrument for measuring the charge and discharge, electrical properties, that attached with various gas (selected) that can be controlled remotely from home. The students of this School, have to build their own instruments.



The sample holder for measuring the electrical conductivity that connected with temperature and gas sensors.





The environment of Colorado School of Mines, Golden, Colorado, USA

FEED BACK

Prof. Evvy Kartini

From: "Ryan O'Hayre" <rohayre@mines.edu>
Date: Tuesday, July 7, 2015 4:01 AM
To: "Prof. Evvy Kartini" <kartini1@batan.go.id>
Cc: "Yongan Yang" <yonyang@mines.edu>; "Prof. Evvy Kartini" <kartini@batan.go.id>
Subject: Re: Invitation letter - collaboration - ICSSI

Dear Prof. Kartini,

I am happy that you enjoyed your visit to the USA and that you safely returned home. It was great to meet you at the SSI conference and I am glad you were able to also meet up with Prof. Yongan Yang to discuss battery research. It looks like my student Chuancheng Duan gave you a very nice tour of our SOFC research facilities. I hope you enjoyed your discussions with him as well. I look forward to continuing our interactions as the next SSI meeting and perhaps someday in Indonesia!

Ryan

Prof. Ryan O'Hayre
Metallurgical and Materials Engineering
Colorado School of Mines
1500 Illinois St.
Golden, CO. 80401

Prof. Evvy Kartini

From: "Yongan Yang" <yonyang@mines.edu>
Date: Tuesday, July 7, 2015 1:43 AM
To: "Prof. Evvy Kartini" <kartini1@batan.go.id>; "Prof. Evvy Kartini" <kartini@batan.go.id>; "Ryan O'Hayre" <rohayre@mines.edu>
Subject: RE: Invitation letter - collaboration - ICSSI

Dear Evvy,
glad that you have arrived home smoothly. It was great to know you via Ryan's introduction and showed you around some beautiful places in Golden. Certainly, it would be great to establish collaborations between us in the future. The report pertinent to my part is fine with me. Below are just to point out two typos:

Page 16: Prof. Evvy Kartini was invited to perform collaboration on battery research
Page 17: Swagelok

thank you for sending me the pictures.

Yongan

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