

Theme: Metrology in Chemistry

Dates: March 21 (Mon) - April 1 (Fri), 2016

Venue: Korea Research Institute of Standards and Science (KRISs), Daejeon, Korea

Organized by: Global Metrology Academy (GMA), KRISs

Overview

(GMA-GT-2016-01-MiC)

Application: by February 10, 2016

The GMA courses have been organized to meet the needs of metrology HRD of the organizations who are responsible for metrology and related functions of national quality infrastructure of the nation. The course [GMA-GT-2016-01-MiC] is the first one to be offered in 2016. Its main theme is metrology in Chemistry (MiC), to be presented in three (3) modules consisting of fundamentals of metrology in general and quality (MiG), Organic Analysis (OA) and Inorganic Analysis (IA). With its main target audience of beginners in analytical chemistry, the MiC course will deliver them the concepts of the traceability and measurement standards along with other key subjects of metrology in chemistry that beginners need to obtain among others.

As an effort to yield as more practical benefit as possible for participants, each session of the MiC course is strategically designed that technical lectures are effectively combined with hands-on laboratory sessions to follow. By the end of the course, participants might have understanding of basic knowledge, skills, and information as up to dated on the key elements of metrology in chemistry. In addition, participants will be given a chance to learn selected fundamental subjects of metrology in general, such as: QMS (ISO/IEC 17025, ISO guide 34), reference materials (ISO guide 35), and the CIPM MRA requirements covering key comparison (KC), calibration and measurement capabilities (CMC), traceability and uncertainty in measurement.

Outline of Course program *[* Subject to Modification!]*

Modules	Subjects	Chief Lecturers
Orientation	Introduction and brief tour (* to be offered for participants who will have arrived by Friday, 18th of March 2016)	GMA
MiG (Days 1-3)	Metrology in General - Seven (7) lectures dealing with the fundamentals of metrology in general	Dr. Jong Oh CHOI (choijongoh@kriss.re.kr)
MiG (Day 4)	Presentation of Lab Reports by Participants - followed by an introduction to the University of Science and Technology (UST), Korea	GMA
TV (Days 5-6)	Technical visit and cultural experience in Seoul (* to be confirmed)	GMA
MiC-OA (Days 8-9)	ORGANIC Analysis	Dr. Byungjoo KIM (byungjoo@kriss.re.kr)
MiC-IA (Days 10-11)	INORGANIC Analysis	Dr. Yong-Hyeon YIM (yhyim@kriss.re.kr)
MiC (Day 12)	Evaluation Test, Individual Lab Visits, Closing Session	GMA

Official language of the course: English
(interpretation service is not available.)

Knowledge and skills

At the end of the course, participants will become familiar with fundamental knowledge on the fundamental subjects of measurement standards, calibration and uncertainty in the fields of metrology in chemistry including organic and inorganic analysis, in particular. Intensive laboratory sessions (ILS) are effectively combined with lectures and hands-on exercises in ways that enable participants to obtain basic skills required for offering quality services for customers. The MiG session will bring broad perspectives to participants that will help them grow up to be the key players in advancing the nation-wide measurement system up to the international level.

Who should

Metrologists who are working on R&D and services relating to the technical areas of measurement and analysis of metrology in chemistry.

Application

Applications to be accepted by February 10, 2016

Welcome to be Partners of Global Metrology Academy!

Modules, Lectures, Hands-on Exercises

* *subject to modifications*

Mar 18 (Fri)	<i>Arrival at Daejeon, check-in at the Hotel Graytone in Daejeon</i>	<i>recommended date of arrival at Daejeon, Korea</i>
Mar 19 (Sat)	Orientation & Brief tour in and around Daejeon city	10:00-17:00 (<u>provisional</u>)
Mar 20 (Sun)	Free	
MiG	Metrology in General: fundamentals of metrology and quality	March 21 (Mon) - 25 (Fri)
	Seven (7) lectures and exercises (uncertainty evaluation)	Lecturers
DAY 1 (Mon) March 21	MiG-1: Metrology in chemistry: an overview	Dr. Sang Ryoul PARK, KRIS
	MiG-2: QMS: why and for what - management/technical requirements (ISO/IEC 17025, ISO Guide 34)	Dr. Hun-Young SO, SHIMADZU, KOREA
	MiG-3: Method validation: overview	Dr. Hun-Young SO, SHIMADZU, KOREA
DAY 2 (Tue) March 22	MiG-4: ISO Guide 35: 2006 RM- general and statistical principles for certification	Dr. Byungjoo KIM, KRIS
	MiG-5: Certified Reference Materials (CRMs) for Metrology in Chemistry	Dr. Euijin Hwang, KRIS
	MiG-6: KC-CMC-Traceability in Measurement	Dr. Jong Oh CHOI, KRIS
DAY 3 (Wed) March 23	MiG-7: Uncertainty in Measurement	Dr. Jong Oh CHOI, KRIS
DAY 4 (Thu) March 24	Presentation of Lab Reports	by participants
	Special Lecture: National Standards System in Korea (* to be confirmed) Introduction of UST (University of Science and Technology)	Prof. Dr. Gun-Woong BAHNG, SUNY KOREA Mr. P. G. LEE, UST
DAY 5 (Fri) March 25	Technical and industrial visits	GMA (staying overnight in Seoul)
DAY 6 (Sat) March 26	Cultural experience in Seoul	Coming down to Daejeon
DAY 7 (Sun) March 27	Free	
MiC	Metrology in Chemistry	March 28 (Mon) - 31 (Thu)
	Intensive Laboratory Session (ILS) with lectures and exercises	(L) Lecture, (H) Hands-on exercises
MiC-OA	ORGANIC Analysis	Mar 28 (Mon)-29 (Tue)
DAY 8 (Mon) March 28	(OA-L-1) Overview of Organic Analysis Laboratory	Dr. Byungjoo KIM, KRIS
	(OA-L-2) Practical Approach for Establishing National Standards in Organic Analysis	Dr. Byungjoo KIM, KRIS
	(OA-H-1) Preparation and Verification of Primary Standard Solutions	Dr. Seonghee Ahn, Dr. Joonhee Lee, KRIS
	(OA-H-2) Preparation of Real Sample for Isotope Dilution Mass Spectrometry (IDMS)	Dr. Seonghee Ahn, Dr. Joonhee Lee, KRIS
	(OA-H-3) Instrumental Analysis of Prepared Samples (Overnight Run)	Dr. Seonghee Ahn, Dr. Joonhee Lee, KRIS
DAY 9 (Tue) March 29	(OA-H-4) Data Reduction of Instrumental Analysis Results	Dr. Seonghee Ahn, Dr. Joonhee Lee, KRIS
	(OA-L-3) Uncertainty Evaluation of Analytical Results of Primary Standard Solutions	Dr. Byungjoo KIM, Dr. Seonghee Ahn, KRIS
	(OA-L-4) Uncertainty Evaluation of Analytical Results of Real Sample	Dr. Byungjoo KIM, Dr. Seonghee Ahn, KRIS
	(OA-L-5) Wrap-up Discussion	Participants & Lecturers
MiC-IA	INORGANIC Analysis	Mar 30 (Wed)-31 (Thu)
DAY 10 (Wed) March 30	(IA-L-1) Overview of Inorganic Analysis Laboratory	Dr. Yong-Hyeon YIM, KRIS
	(IA-L-2) Elemental Standard Solutions	Dr. Euijin Hwang, KRIS
	(IA-H-1) Preparation & Certification of Elemental Standard Solutions	Mr. Hyung-Sik MIN & Mr. Myungsub Han, KRIS
DAY 11 (Thu) March 31	(IA-L-3) Introduction to Matrix CRMs and Their Production	Dr. Sook-Heun KIM, KRIS
	(IA-L-4) Certification and Uncertainty Evaluation of Matrix CRM by ID-ICPMS	Dr. Kyoung-Seok LEE, KRIS
	(IA-H-2) Matrix CRM Production & ID-ICPMS Certification	Dr. Sook-Heun KIM, Dr. Sung Woo HEO, KRIS Ms. Youngran LIM, Mr. Myung Chul LIM, KRIS
MiC	Wrap-up and Closing	April 1 (Fri)
DAY 12 (Fri) April 1	Performance evaluation test, Individual Lab Visits, Closing session	Participants & Lecturers Participants, GMA
April 2 (Sat)	Departure: April 2 (Sat)- 3(Sun)	* Depending on the flight itinerary

* ISO/IEC 17025: 2005 General requirements for the competence of testing and calibration laboratories

* ISO Guide 34: 2009 General requirements for the competence of RM producers

* ISO Guide 35: 2006 Reference materials - general and statistical principles for certification

Daily Program (Provisional)

Language of the course: **English**

Mar 18 (Fri)~	Arrival at ICN airport, down to Daejeon, Check-in at the Hotel Graytone	
Mar 19 (Sat) 10:00-17:00	Orientation & Brief tour in and around Daejeon city (for participants who will have arrived at Daejeon by Friday, Mar 18)	* ride & lunch to be offered by KRISS
Mar 20 (Sun)	FREE	
Mar 21 (Mon)	Opening & Metrology in General (MiG)	Seminar room (CRM Lab Bldg. 2nd floor)
08:30-09:00	From Hotel to KRISS (* ride offered by KRISS)	GMA (Sangwook Seo)
09:00-09:40	Greetings and Introduction to KRISS and the GMA Course	
10:00-10:30	Opening ceremony	Conference room (Admin. Bldg. 2nd floor)
10:45-12:30	MiG-1: Metrology in chemistry: an overview	Dr. Sang Ryoul PARK
12:30-14:00	Lunch	KRIS cafeteria (floor 2)
14:00-15:30	MiG-2: QMS: why and for what - management/technical requirements with ISO/IEC 17025, ISO Guide 34	Dr. Hun-Young SO
15:30-17:00	MiG-3: Method Validation	Dr. Hun-Young SO
17:00-17:30	From KRISS to Hotel (* ride offered by KRISS)	GMA (Sangwook Seo)
Mar 22 (Tue)	Metrology in General (MiG)	Seminar room (CRM bldg. 2nd floor)
08:30-09:00	From Hotel to KRISS (* ride offered by KRISS)	GMA (Sangwook Seo)
09:30-12:00	MiG-4: ISO Guide 35: 2006 RM - general and statistical principles for certification (1-2)	Dr. Byungjoo KIM
12:00-13:30	Lunch	KRIS cafeteria (floor 2)
13:00-15:30	MiG-5: Certified Reference Materials (CRM) for Metrology in Chemistry	Dr. Euijin HWANG
15:00-15:30	Tea break	
15:30-17:00	MiG-6: KC-CMC-Traceability in Measurement	Dr. Jong Oh CHOI
17:00-17:30	From KRISS to Hotel (* ride offered by KRISS)	GMA (Sangwook Seo)
Mar 23 (Wed)	Metrology in General (MiG)	Seminar room (CRM bldg. 2nd floor)
08:30-09:00	From Hotel to KRISS (* ride offered by KRISS)	GMA (Sangwook Seo)
09:30-12:00	MiG-7: Uncertainty in Measurement	Dr. Jong Oh CHOI
12:00-13:30	Lunch	KRIS cafeteria (floor 2)
13:30-17:00	MiG-7: Uncertainty in Measurement (* including exercise)	Dr. Jong Oh CHOI
17:00-17:30	From KRISS to Hotel (* ride offered by KRISS)	GMA (Sangwook Seo)
Mar 24 (Thu)	Presentation of Lab Reports, Special Lecture	Seminar room (CRM bldg. 2nd floor)
08:30-09:00	From Hotel to KRISS (* ride offered by KRISS)	GMA (Sangwook Seo)
09:30-10:45	Presentation of Lab Reports (Q&A incl.)	Five (5) countries
10:45-11:00	Tea break	
11:00-12:30	Presentation of Lab Reports (Q&A incl.)	Six (6) countries
12:30-14:00	Lunch	KRIS cafeteria (floor 2)
14:00-14:30	Wrap-up of Presentations	Q&A among participants
14:30-16:00	Special Lecture: National Standards System in Korea (* to be confirmed)	Prof. Dr. Gun-Woong BAHNG, SUNY Korea
16:00-16:15	Tea break	
16:15-17:00	Presentation of University of Science and Technology (UST), Korea	Mr. P. G. LEE, UST
17:00-17:30	From KRISS to Hotel (* ride offered by KRISS)	GMA (Sangwook Seo)
Mar 25 (Fri)	Technical Visit	GMA
09:30-17:00	SAMSUNG Innovation Museum (* to be confirmed) - staying overnight in Seoul	* ride & lunch to be offered by KRISS
Mar 26 (Sat)	Cultural Experiences	GMA
09:00-17:00	Historic sites & cultural attractions (Insa-dong, Gyeong-Bok Palace, Myeong-dong)	* ride & lunch to be offered by KRISS
17:00-19:00	From Seoul down to Daejeon (The Hotel Graytone)	
March 27 (Sun)	Free	

Daily Program (Provisional)

Language of the course: **English**

MIC-OA	ORGANIC Analysis	Seminar room (CRM bldg. 2nd floor)
Mar 28 (Mon)	Lectures (L), Hands-on Exercises (H)	Hands-on session: Laboratories in charge
08:30-09:30	From Hotel to KRISs (* ride offered by KRISs)	GMA (Sangwook Seo)
09:30-10:30	(OA-L-1) Overview of Organic Analysis Laboratory	Dr. Byungjoo KIM
10:30-12:30	(OA-L-2) Practical Approach for Establishing National Standards in Organic Analysis	Dr. Byungjoo KIM
12:30-14:00	Lunch	KRISs cafeteria (floor 2)
14:00-15:30	(OA-H-1) Preparation and Verification of Primary Standard Solutions	Dr. Seonghee Ahn/Dr. Joonhee Lee
15:30-16:30	(OA-H-2) Preparation of Real Sample for Isotope Dilution Mass Spectrometry (IDMS)	Dr. Seonghee Ahn/Dr. Joonhee Lee
15:30-16:30	(OA-H-3) Instrumental Analysis of Prepared Samples (Overnight Run)	Dr. Seonghee Ahn/Dr. Joonhee Lee
17:00-17:30	From KRISs to Hotel (* ride offered by KRISs)	GMA (Sangwook Seo)
Mar 29 (Tue)	Lectures (L), Hands-on Exercises (H)	Hands-on session: Laboratories in charge
08:30-09:00	From Hotel to KRISs (* ride offered by KRISs)	GMA (Sangwook Seo)
09:30-11:00	(OA-H-4) Data Reduction of Instrumental Analysis Results	Dr. Seonghee Ahn/Dr. Joonhee Lee
11:00-12:30	(OA-L-3) Uncertainty Evaluation of Analytical Results of Primary Standard Solutions	Dr. Byungjoo KIM/Dr. Seonghee Ahn
12:30-14:00	Lunch	KRISs cafeteria (floor 2)
14:00-17:00	(OA-L-4) Uncertainty Evaluation of Analytical Results of Real Sample	Dr. Byungjoo KIM/Dr. Seonghee Ahn
16:00-17:00	(OA-L-5) Wrap-up Discussion	Dr. B KIM/Dr. S Ahn/Dr. J Lee
17:00-17:30	From KRISs to Hotel (* ride offered by KRISs)	GMA (Sangwook Seo)
MiC-IA	INORGANIC Analysis	Seminar room (CRM bldg. 2nd floor)
Mar 30 (Wed)	Lectures (L), Hands-on Exercises (H)	Hands-on session: Laboratories in charge
08:30-09:00	From Hotel to KRISs (* ride offered by KRISs)	GMA (Sangwook Seo)
09:30-10:30	(IA-L-1) Overview of Inorganic Analysis Laboratory	Dr. Yong-Hyeon YIM
10:30-12:30	(IA-L-2) Preparation and Certification of Elemental Standard Solutions	Dr. Euijin Hwang
12:30-14:00	Lunch	KRISs cafeteria (floor 2)
14:00-17:00	(IA-H-1) Preparation & Certification of Elemental Standard Solutions	Mr. Hyung-Sik MIN & Mr. Myungsub HAN
17:00-17:30	From KRISs to Hotel (* ride offered by KRISs)	GMA (Sangwook Seo)
Mar 31 (Thu)	Lectures (L), Hands-on Exercises (H)	Hands-on session: Laboratories in charge
08:30-09:00	From Hotel to KRISs (* ride offered by KRISs)	GMA (Sangwook Seo)
09:30-10:00	(IA-L-3) Introduction to Matrix CRMs and Their Production	Dr. Sook-Heun KIM
10:00-11:30	(IA-L-4) Certification and Uncertainty Evaluation of Matrix CRM by ID-ICPMS	Dr. Kyoung-Seok LEE
12:30-14:00	Lunch	KRISs cafeteria (floor 2)
14:00-17:00	(IA-H-2) Matrix CRM Production & ID-ICPMS Certification	Dr. Sook-Heun KIM/Dr. Sung Woo HEO/Ms. Youngran LIM/Mr. Myung Chul LIM
17:00-17:30	From KRISs to the Hotel (* ride offered by KRISs)	GMA (Sangwook Seo)
18:30-18:40	From Hotel to Restaurant "La Fiesta"	walking distance (five minutes)
18:40-21:00	Farewell Dinner	"La Fiesta" (* to be confirmed)
21:00-21:10	Return to Hotel	GMA (Sangwook Seo)
Apr 1 (Fri)	Evaluation, Individual Lab Visits, Closing	Conference room (Admin. Bldg. 2nd floor)
09:00-09:30	From Hotel to KRISs (* ride offered by KRISs)	GMA (Sangwook Seo)
09:30-11:00	Performance Evaluation Test	
11:00-12:30	Individual lab visits	
12:30-13:30	Lunch	
13:30-14:30	Evaluation of the course (written and oral)	KRISs cafeteria (floor 2)
14:30-15:00	Closing ceremony (certificate awarding)	Conference room (ADM Bldg. 2nd floor)
15:00-15:30	Return to the Hotel (* ride offered by KRISs)	GMA (Sangwook Seo)
April 2 (Sat)	Departure	<i>depending the flight itinerary of participants</i>
	* Participants are supposed to take the airport limousine bus bound for Incheon airport.	
	* Ride to the bus stop near the hotel will be provided by the Hotel Graytone in cooperation with GMA, KRISs.	
<p><i>Dress code for the farewell dinner : traditional costumes</i></p> <p>☺ Participants are recommended to get dressed with their traditional costumes at the farewell dinner scheduled on the evening of March 31 (Thu).</p> <p>☺ Singing, dancing, and any other type of performance by every participant are strongly encouraged! "Carpe diem!"</p>		
Contact Points For further information about participation in the workshop, please contact:		
Sangwook SEO, Senior Coordinator, Global Metrology Academy (GMA), KRISs		swseo@kriss.re.kr
		GLOBAL METROLOGY ACADEMY

□ Qualification

1. The applicant should be officially nominated by the employer, whose official seal and signature should be put on the application/nomination form.
2. The applicant should be an employee of the national metrology institute (NMI) or measurement service laboratory at the time of application.
3. The applicant should be engaged in R&D and services in the areas of metrology in chemistry (MiC) with emphasis on analytical chemistry.
4. The applicant should be a university/college graduate or have equivalent professional experiences and knowledge on theme of the course (MiC).
5. For the sake of effectiveness, the applicant is required to have a good command of **English**.
6. The applicant should be healthy both physically and mentally enough to go through the whole programs of the course.

□ Requirements: applications are accepted by February 10, 2016, along with the following requirements.

1. **An official nomination** by the employer with the official seal and the signature of the top management of the employer;
2. A copy of the **curriculum vitae** of the applicant, describing the academic background and professional experience in detail;
3. A copy of **passport** as valid for more than six (6) months as of the expected date of arrival at Korea (March 18, 2016);
4. **Laboratory report and Action Plan**: Selected participants are supposed to submit their laboratory reports and draft action plans according to the template to be provided later on; and
5. Plan of sharing the results of his/her study in the GMA course for their institution and the nation.

□ Number of participants: each course will be operated with around 10 participants.

Financial Arrangements

- Participants and their employers are responsible for paying all expenses of the tuition fees, airline tickets, accommodations and meals, etc. required for the participants' travel to and stay in Korea.
- Lunches for ten (10) working days are offered free to ALL participants.
- Subject to the availability of fund, additional financial assistance might be discussed for a limited number of people from developing countries.

1. Tuition fees	<p>① Amount: US\$500/US\$1,000 per person</p> <ul style="list-style-type: none"> ☞ Two different categories of the tuition fees are applicable according to the economic performance of the applicant's country. ☞ Please contact the coordinator, <u>BEFORE making applications</u>, to get confirmed of the tuition fee category applicable for you.
2. Banking information	<p>② Applicants are supposed to remit the tuition fees by bank transfer to the official bank account of KRISS.</p> <ul style="list-style-type: none"> ☞ Payment should be made by February 29, 2016 which will make the application complete. ☞ Please make sure that all the handling and banking charges raised both to the remitter and beneficiary should be paid by the remitter, so that the <u>net amount of tuition fees (US\$500 or US\$1,000) could be received by KRISS</u>. <p>Official bank account of KRISS</p> <ul style="list-style-type: none"> - Bank name: Kook-Min Bank (Branch: Yuseong Branch) - Swift code: CZNBKRSE - Account number: 461-01-0184-494 - Account holder's name: Korea Research Institute of Standards and Science (KRIS) - Bank address: 1F, #468-3, Bongmyeong-dong, Yuseong-gu, Daejeon, Republic of Korea <p>☞ invoices will not be issued separately if otherwise requested. (* Receipts might be issued upon the participant's arrival at KRIS.)</p> <p>☞ The statement of bank transfer should be sent to KRIS either by Email (swseo@kriss.re.kr) or FAX (+82-42-868-5565) with attention to the course coordinator.</p>
2. Living expenses	<p>Participants are responsible for paying living expenses in Korea including accommodations and meals.</p> <p>For selected participants from the developing world, KRIS might provide free accommodations, subject to its financial availability. Lunches for ten (10) working days will be offered free to ALL participants.</p> <p>⑥ Please note that expenses for all other meals shall be paid by the participants.</p> <ul style="list-style-type: none"> ☞ Participants are advised to bring some pocket money of their own for incidental expenses. <p>It is likely that participants will stay at the Hotel Graytone, Dunsan in Daejeon. (http://www.graytone.co.kr/) The room rate (around US\$55 per night per room) includes breakfast, tax, and service charge.</p>
3. Airline tickets	<p>Participants and their employers are responsible for purchasing the airline tickets for the participants.</p>
4. Local Transportation	<p>⑨ The KRIS travel agent will pick up the participants upon their arrival at the Incheon (ICN) international airport of Seoul.</p> <ul style="list-style-type: none"> ☞ Participants are requested to advise the course coordinator of their flight itinerary to and from Korea AS SOON AS Possible. <p>⑩ The KRIS travel agent will help the participants to take the airport limousine bus bound for Daejeon.</p> <ul style="list-style-type: none"> ☞ The bus tickets (around US\$23 one way) are to be bought by the participants. ☞ Upon your arrival at the bus stop in Daejeon ("Government Complex-Daejeon"), the staff of the Hotel Graytone will be meeting you to take you to the hotel.

Every applicant and participant should commit to read, strictly abide by, and respect the following rules and regulations as specified below that GMA endorses in implementing the group course:

1. Participants shall conduct themselves at all times in a manner compatible with their status as participants in the subject GMA course;
2. Participants shall attend, to the best of their abilities, all sessions of the GMA group and/or individual courses they are participating in;
3. Participants shall refrain from engaging in political activity or any form of employment for profit or gain;
4. Participants shall return to their home country upon completion of the subject course of GMA and resume work in their country;
5. Participants shall not extend the length of stay in Korea for personal convenience;
6. Participants whose flights are supported by GMA and other donor organizations are not permitted to change their flights for their personal convenience;
7. Participants shall not be accompanied by any member of their family;
8. Participants shall assume responsibility for any personal expenses incurred regardless of implementation of the course; and
9. Participants are required to strictly observe the course schedule and abide by the **rules and regulations stipulated by the KRISS and their sponsors, and the laws of the Republic of Korea.**
10. Any form of harassment or insult, including but not limited to misconduct arising out of racial/ethnic, gender or class discrimination, whether it be physical or verbal, will not be tolerated and will be dealt with in accordance with the laws of the Republic of Korea and the rules and regulations of KRISS.
11. Especially, **sexual harassment**, defined as a form of behavior characterized by sexually connotative words, acts or gestures that could undermine individual dignity and by which the victim takes offense, is regarded as a serious misconduct and will be dealt with accordingly.
12. Offenders who fail to comply with the above **Rules and Regulations** laws shall be subject to punishment in accordance with the laws of the Republic of Korea and the regulations of KRISS, **which include sending an official letter of complaint to the offender's employer and government and instant deportation with ban of the offender's participation in the future GMA programs.**



Contact Points

For further information about participation in the GMA course, please contact:

Sangwook SEO (Coordinator) Senior Project Manager, Global Metrology Academy (GMA), KRISS	swseo@kriss.re.kr TEL + 82-42-868-5440 Fax + 82-42-868-5565
Dr. Gyeong-Hee NAM Head, Global Metrology Academy (GMA), KRISS	ghnam@kriss.re.kr TEL + 82-42-868-5412 Fax + 82-42-868-5565