

# **Advanced Project Based Learning (aPBL): SIT-IITM-IITD-UPM-KMUTT**

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Board of Councilor

Shibaura Institute of Technology (SIT), , 3-7-5 Toyosu, Koto-Ku, Tokyo, JAPAN

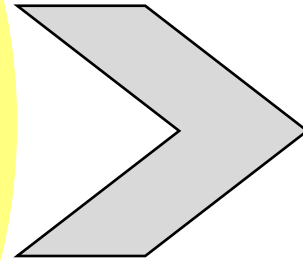
WORLD TECHNOLOGY  
UNIVERSITIES NETWORK



# SIT Strategic Goal

- **Top 10 technical universities in Asia, towards centennial SIT (2027)**

- We chose 3 ranking systems to achieve the goal



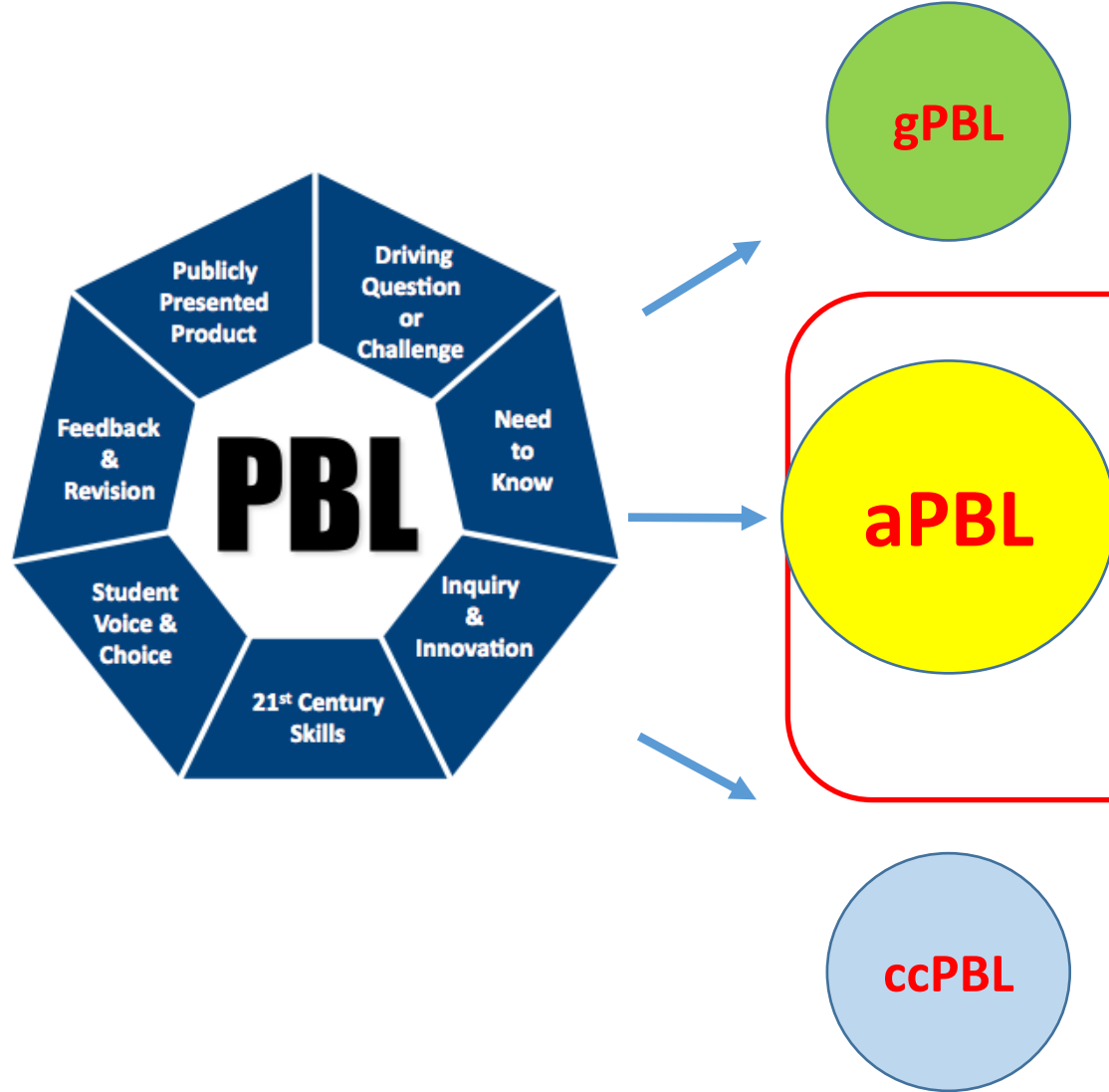
## What do we need!

- ✓ **Global Collaborating Partner Universities**
- ✓ **Extensive Research Collaboration**
- ✓ **High Research Output**
- ✓ **Visibility and Reach**
- ✓ **Research Exchanges**

# Smart Programs towards SIT Strategic Goal



# Types of PBL programs



- Students from Japan and overseas partner universities working as tag teams will discuss and solve problems presented by professors, Japanese corporations, and organizations.
- Students engaged in acquiring problem-solving capabilities, systems thinking, and systems management skills

- ✓ Students collaborate to solve existing cutting edge research gaps.
- ✓ Interaction with prominent teaching staff from both universities
- ✓ High impact journal Collaborative publications & citations
- ✓ High level of research collaboration and research output

- Having a cultural exchange between students studying in Japan and other nations
- Providing constrictive opinion with people who have different identities
- Enhancing your skills for the global communication & PBL



# ADVANCED PROJECT BASED LEARNING (aPBL)



# Aim and Objectives (aPBL)

## AIM

aPBL is a 2-week research-based program that involves collaborative research between different universities to improve the scientific and technological visibility of SIT.

## OBJECTIVES

- Improvement of relations between universities.
- Collaborative research leading to strong and numerous research publications.
- The most important outcome of this program is to increase research footprint of SIT globally and improve the outlook of SIT for climbing up the ranking system.



# Collaborative aPBL Projects



**SIT**

Students – several  
Professors- several

**Project-5**



**KMUTT**

Students - 4  
Professors - 1

**Project-1, 2**



**IITM**

Students - 10  
Professors - 2

**Project-4**



**UPM**

Students - 5  
Professors - 1

**Project-3**



**IITD**

Students - 6  
Professors - 1

# aPBL Contents

## Program Outline

<b>DAY1</b>	<b>Mon</b>	<b>Arrival at Japan</b>
<b>DAY2</b>	<b>Tue</b>	<b>Orientation, Opening Ceremony, Campus Tour, Tutorial, Ice breaking, Group Discussion</b>
<b>DAY3</b>	<b>Wed</b>	<b>Workshop</b>
<b>DAY4</b>	<b>Thu</b>	<b>Workshop</b>
<b>DAY5</b>	<b>Fri</b>	<b>Workshop</b>
<b>DAY6</b>	<b>Sat</b>	<b>Workshop</b>
<b>DAY7</b>	<b>Sun</b>	<b>Cultural Visit</b>
<b>DAY8</b>	<b>Mon</b>	<b>Prepare Reports</b>
<b>DAY9</b>	<b>Tue</b>	<b>Observe Symposium, Final presentation, Closing Ceremony</b>
<b>DAY10</b>	<b>Wed</b>	<b>Final Report / Departure from Japan</b>



# aPBL Opening Ceremony

- Opening was addressed by President, Prof. Masato Murakami and Deputy President, Prof. Muralidhar Miryala
- Remarks from Invited guest Mr. Raj Kumar Srivastav, Charge d'affaires a.i., Indian Embassy, Tokyo, Japan.
- Special Messages and Lectures from partner university professors
  - Indian Institute of Technology Madras (IITM), Prof. M.S.Ramachandra Rao, Asst. Prof. KOLLA LAKSHMI GANAPATHI and Asst. Prof. ARORA ANKIT
  - Indian Institute of Technology Delhi (IITD) Assistant Prof. Dhaka Rajendra Singh
  - University Putra Malaysia (UPM), Assistant Prof. Chen Soo Kien
  - King Mongkut's University of Technology Thonburi(KMUTT), Assistant Prof. WONGSATANAWARID ATIKORN, Asst. Prof. RATANAPHAN SUTATCH.
- Networking and Group Photo



# Ice Breaking

- A round table discussion with all the universities along with the students with SIT participants for assisting and being part of the research in aPBL.
- The foreign students were split into groups based on university.
- After tremendous discussion we decided on **5 projects** that will be working on, followed by assigning roles to the group members.
- **24 students** from various universities mentioned above participated along with SIT students had taken a prominent role in this aPBL and **4 professors and assistant professors** also came from their respective universities. **From SIT, 13 students** participated as TA`s as well as participants along **3 professors and 4 staff**.





# Project-1

## IITM:

- Kelvin Probe Force Microscopy (KPFM) for the comparison of work function in  $\text{MoS}_2$  and Au coated  $\text{MoS}_2$  and muscovite.
  - Electron probe micro-analyzer (EPMA) for elemental distribution in  $\text{ZnO}/\text{ZnCr}_2\text{O}_4$  nanostructures and distribution of elements in Ga doped  $\text{LaCrO}_3$ .
- 
- Students from SIT and IITM interacted closely and worked together.
  - Teaching staff from both sides assisted and guided the project.

Group 1 (IITM) /MSR Rao
Arora ankit
Sahoo Anubhab
Lakshmi Ganapathi
Raja Lakshmi
Ritu Das

SIT group (SIT participants)
Teaching Staff - 2
Postdoc - 1
Ph.D. Students - 1
Undergrads - 2



# Project-2

## IITM:

- EPMA, CL and Raman studies in bulk  $\text{Y}_3\text{Fe}_5\text{O}_{12}$  (YIG) and thin films.
- Transmission electron microscopy (TEM) for Mg-ZnO nanoparticles.
- Both IITM & SIT students learned lot of new things and gained experience on new equipment such as sputtering and FE-SEM during this project.

### Group 2 (IITM) MSR Rao

Tejendra dixit

Pradhan soumen

Suresh sreya

Saroha Anju

Akash

### SIT group (SIT participants)

Teaching Staff - 2

Postdoc – 1

Ph.D. Students - 1

Undergrads - 1



# Project-3

## IITD:

- Structural characterization of Nb-doped  $\text{Na}_x\text{CoO}_2$  using XRD
  - FC/ZFC studies LSCNO-LAO films.
  - Study on  $\text{S}_2\text{CN}/\text{NGO}$  films.
  - Study on CCA/Si pulse laser deposited films and NCMA
- SIT students have performed various characterization techniques for the IITD students.
  - Both sides rigorously discussed to analyze the results from XRD and SQUID magnetometer.

Group 3 (IITD) D Rajendra Singh
Maurya Vishal Kumar
Shukla Rishabh
Mahesh Chandra
Gupt Guru Dutt
Kumar Ajay

SIT group (SIT participants)
Teaching Staff - 2
Postdoc - 1
Ph.D. Students - 2
Undergrads - 2





# Project-4

## UPM:

- Effect of Heat Treatment Condition in the Superconducting Properties and Grain Connectivity of Ex-situ  $\text{MgB}_2$ .
  - Synthesis and Characterization of YBCO-123 Superconductor with addition of  $\text{BiFeO}_3$ .
  - Bi-2212 Superconductor with Addition of CNTs.
  - Cobalt Ferrite Nanoparticles Addition On Thallium-based High Temperature Superconductors
- 
- Students discussed a lot regarding the microstructural analysis and took aid of teaching staff and postdocs for understanding different images.

Group 4 (UPM) Chen Soo Kien
Lau Lik Anguong
Nurhidayah Binti Mohd Hapipi
Nurul Auni Binti Khalid
Safia izzati binti abd sukor
Nur Athirah Binti che dzulkifli

SIT group (SIT participants)
Teaching Staff - 2
Postdoc - 1
Ph.D. Students - 1
Undergrads - 2



# Project-5

## KMUTT:

- Study on  $\text{MgB}_2$  and  $\text{SrTiO}_3$
- Grain boundaries study-morphology using SEM-edx/ebsd
- Both staff and students worked hard to characterize the materials.

Group 5 (KMUTT) W Atikorn
Sriondee Manlika
Nammahachak Nant
Ratanaphan Sutatch
Saengsawang suittipot

SIT group (SIT participants)
Teaching Staff - 2
Postdoc - 1
Ph.D. Students - 1
Undergrads - 1



# Closing Ceremony

- ❖ After the final Presentations of the projects. Every participant was awarded followed by a tasty buffet lunch.
- ❖ All Professors and participants had expressed their experiences of the programs.
- ❖ The program was a huge success despite being the first research based PBL.





# Publications from 2-week aPBL program

1. Spin Dynamics and Unconventional Magnetism in Insulating  $\text{La}_{1-2x}\text{Sr}_{2x}\text{Co}_{(1-x)}\text{Nb}_x\text{O}_3$

R. Shukla, A. Jain, M. Miryala, M. Murakami, K. Ueno, S.M. Yusuf, and R.S. Dhaka

*Journal of Physical Chemistry C*, (2019) **123**, 22457-22469 (IF 4.189). **IITD**

2. Plasmon Assisted Selective Enhancement of Direct Band Transitions in Multi-layer  $\text{MoS}_2$

T. Dixit, A. Arora, M. Muralidhar, M. Murakami, P. K. Nayak, K.L. Ganapathi, and M.S.R. Rao

*IEEE Photonics Journal* (2019) **11**, 450116 pp.6 (IF 2.833). **IITM**

3. Exciton Lasing in  $\text{ZnO-ZnCr}_2\text{O}_4$  Nanowalls

T. Dixit, J. Agrawal, M. Muralidhar, M. Murakami, K.L. Ganapathi, V. Singh and M.S.R. Rao

*IEEE Photonics Journal* (2019) **11**, 4501307 pp.7 (IF 2.833). **IITM**

4. Comparative study on AC susceptibility of  $\text{YBa}_2\text{Cu}_3\text{O}_{7-\delta}$  added with  $\text{BaZrO}_3$  Nanoparticles Prepared via Solid-State and Co-Precipitation Method, Nurhidayah Mohd Hapipi, Jee Khan Lim, Soo Kien Chen, Oon Jew Lee, Abdul Halim Shaari, Mohd Mustafa Awang Kechik, Kean Pah Lim, Kar Ban Tan, Mastato Murakami, and Muralidhar Miryala

*Journal of Crystals* (2019) **9**, **655**, pp.12 (IF: 2.589). **UPM**

5. Nanoscale Probing of Magnetic and Electrical Properties of  $\text{YIG/Si}$  (100) Thin Films Grown by Pulsed Laser Deposition, Saroha, A., Dixit, T., Ganapathi, K. L., Muralidhar, M., Murakami, M. & Rao, M. S. R., 2020, In: *IEEE Magnetism Letters*. 11, 9057393 (IF: 1.672) **IITM**

6. Structural, transport, optical, and electronic properties of  $\text{Sr}_2\text{CoNbO}_6$  thin films, Ajay Kumar, Rishabh Shukla, Akhilesh Pandey, Sandeep Dalal, M. Miryala, K. Ueno, M. Murakami, and R. S. Dhaka, 2020, In : *Journal of Applied Physics*. 128, 025303 (IF2.546). **IITD**

7. Femtosecond Pulse Ablation Assisted Mg-ZnO Nanoparticles for UV-Only Emission, Sahoo, A.; Miryala, M.; Dixit, T.; Klimkiewicz, A.; Francis, B.; Murakami, M.; Rao, M.S.R.; Krishnan, S., 2020, In : *Nanomaterials*. 10, 1326 (IF 4.324). **IITM**

8. Enhancement of critical current density for  $\text{MgB}_2$  prepared using carbon-encapsulated boron with co-addition of  $\text{Dy}_2\text{O}_3$  and  $\text{La}_2\text{O}_3$ , Nurhidayah Mohd Hapipia, Muralidhar Miryala, Soo Kien Chen, Sai Srikanth Arvapalli, Masato Murakami, Mohd Mustafa Awang Kechik, Kar Ban Tan, Oon Jew Lee, 1 October 2020, In : *Ceramics International*. 46, 14, pp. 23041-23048 (IF 4.524). **UPM**



# Reviews on aPBL Program



**We received a wholesome positive response from all the participants. Everybody got to learn and contribute to the project and felt satisfied. Here are some reviews from them!!!**

I am very much satisfied with this exchange program. This was my first time visit to Japan. I have learnt lots of things from this program like Japanese culture, their discipline. Really this program will be one of my lifetime memory. I am very much thankful to Prof. Masato Murakami (president of SIT), Prof. Muralidhar Miryala, Prof. M. S. Ramachandra Rao (my research supervisor) and all the students of SIT who have helped us during this program.

- **SOUMEN PRADHAN, IITM**

I am very pleased and feeling really great honored to be the part of this program. I thank Prof. Dr. M. Miryala and all organizing committee to make this program so pleasurable and successful.

- **RISHABH SHUKLA, IITD**

This is a very good program for exchanging multiple ideas in science and technology, learning cutting edge science techniques from each other as well as developing indo-japan cultural understandings. Program was a total success above mentioned criteria. I would like to participate in similar programs in future too.

- **VISHAL MAURYA, IITD**

All the activities and programs are up to my expectations. I have a great opportunity learning and handling the machines for characterization like SEM and XRD. Facilitators and organizers are all very kind and help me a lot along the programs. The foods also so nice and its halal. Very Muslim-friendly, thank you. I enjoyed the presentation session as I gained a lot during the question-answer session.

- **NUR ATHIRAH BINTI CHE DZUL-KIFLI, UPM**

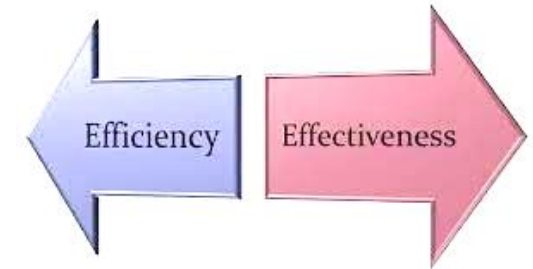
This is a very good program not only in term of knowledge exchange and also the Japanese culture experience.

- **LAU LIK NGUONG, UPM**



# Conclusions of aPBL program

- ❖ 2 week program led to a lot of international peer reviewed publications.
- ❖ Improved International outlook for SIT. Strengthened collaborations with partner universities.
- ❖ High research & knowledge exchange that benefit both students and universities.
- ❖ Very efficient and effective, with 100% positive reviews from the participants.
- ❖ High impact contribution to university ranking progress. Very promising exchange program for achieving the strategic SIT goals on time.



## Top Global University Project



Government chose **37 UNIVERSITIES** to be role models for the globalization of Japanese educational institutions.



SIT is the **ONLY** university in private science and engineering universities in Japan to receive federal funds for this project.



**RANKED**

**#1001+**

THE World University Ranking 2021

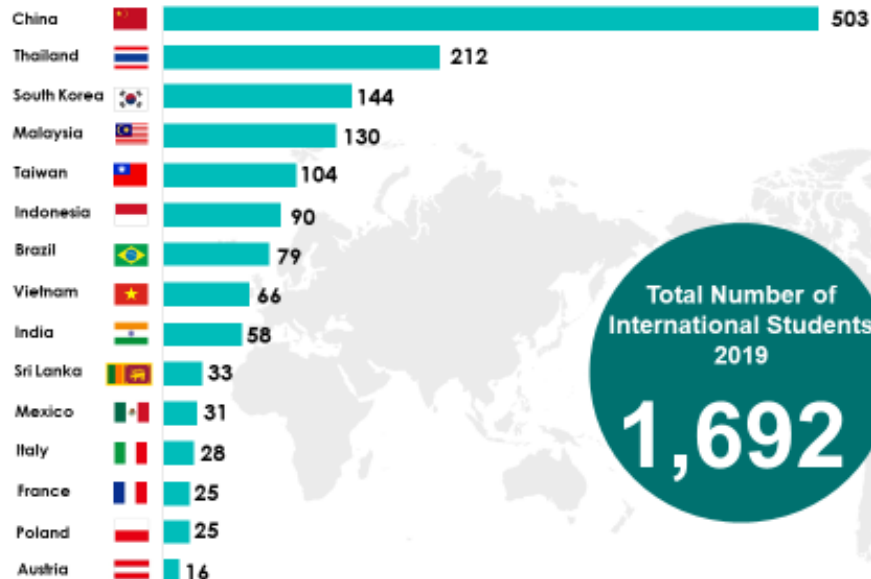
**#35**

THE JAPAN University Ranking 2020

**#8**

THE JAPAN University Ranking 2020 (Private University)

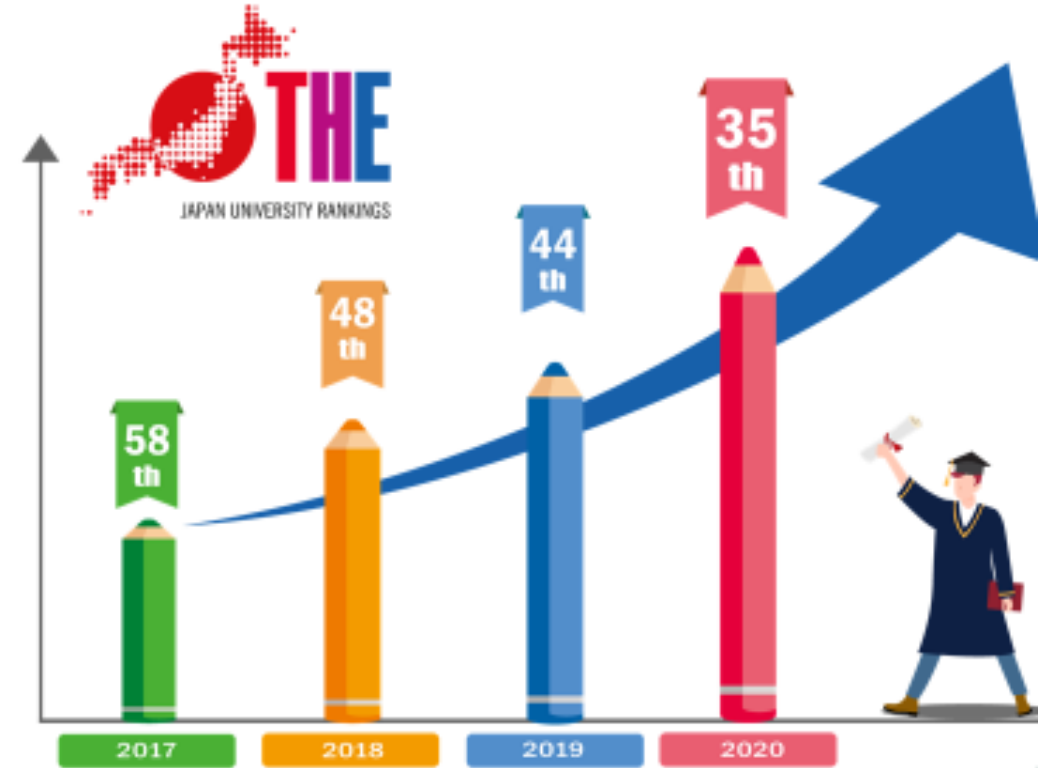
## Number of International Students (Top 15)



Total Number of International Students 2019

**1,692**

## Rankings in Japan



- SIT plans to increase the number of foreign students in upcoming years.
- We are continuously working towards globalization and improve the university ranking.