2025 年度
FY2025

Graduate School of Engineering, The University of Tokyo

Department of Materials Engineering

Master’s and Doctoral Programs

Guide to Entrance Examination

/ Contact Information

Department Office, Department of Materials Engineering, The University of Tokyo
TEL: 03-5841-7091, E-mail: exam@material.t.u-tokyo.ac.jp

/ Website
https://www.material.t.u-tokyo.ac.jp/

45 20

https://www.t.u-tokyo.ac.jp/soe/admission/general_number.html

The Department of Materials Engineering is recruiting 45 master's students and 20 doctoral students. In response to the expansion of the field of materials engineering in recent years, we welcome the applicants who not only have been educated in materials engineering, but also have learned the basics of materials engineering such as physics and chemistry, and who are willing to learn materials engineering from the standpoint of applying it to bio / mechanical / electronic devices. Please refer to the Graduate School of Engineering website (https://www.t.u-tokyo.ac.jp/en/soe/admission/general-number) for the numbers of applicants and successful applicants last year.

/ About the Entrance Examination

/ Applications, etc.

1.

For details on application eligibility, application procedures, application period, announcement of successful applicants, etc., please refer to the Guidelines for Applicants to the Entrance Examination (Master's Program, Doctoral Program) at the Graduate School of Engineering, the University of Tokyo.

2.

Applicants for the doctoral program need to submit a "Questionnaire sheet Doctoral course ". Please fill in the necessary items in the form attached in this guide, and submit it together with the application form.

/ Notes

1.

If the content of this entrance examination guide is changed, it will be announced on the websites of the Graduate School of Engineering and of the Department of Materials Engineering. Check the websites frequently.

2.

In principle, the Written Examinations (regular education subjects and fundamentals of materials) and Oral Examinations will be conducted on-site (Hongo Campus, the University of Tokyo).

3. B

2024 10 1

There is a possibility that the Entrance Examination for the Department of Materials Engineering will be conducted on the Application Schedule B (Winter Exam). Whether or not it will be implemented will be announced on the website of the Graduate School of Engineering around October 1, 2024.

4.

If false statements or fabrications are found in the application documents, or if there is any misconduct in the examination, the pass or admission may be canceled retroactively even after passing or admission.

/ Examination Content and Date

/ Master's Program

TOEFL TOEIC L&R

The Entrance Examination is based on the Foreign Language (English) Examination by submitting the official score of TOEFL or TOEIC L&R, the Written Examinations (regular education subjects and fundamentals of materials), and the Oral Examination. The contents of the tests are as shown in the table below. The Entrance Examination for the master's program is conducted with the same subjects for all examinees.

Foreign Language (English) Examination	TOEFL TOEIC L&R 2022 9 TOEFL TOEFL iBT TOEFL iBT Home Edition 7(2025) TOEFL 2024 8 9 Test Date Scores TOEIC L&R TOEIC L&R TOEIC IP TOEIC Bridge TOEIC S&W 1. URL 2024 8 9 WEB 2. 113-8656 7-3-1 2024 8 9 Submit the official score of TOEFL or TOEIC L&R. Applicants must choose which score to submit at the time of application, and changes to this choice will not be allowed after the application period. Only scores from tests with a Test Date in September 2022 or later are valid. Applicants should plan ahead to allow ample time for taking a test before applying for the Entrance Examination. For submitting a TOEFL official score Submit the official score of either the TOEFL iBT or the TOEFL iBT Home Edition. See the website of the Graduate School of Engineering "Admissions Information for Graduate School", "Application Guidelines", and "Notice regarding Foreign Language (English) Examinations". Applicants must submit the score to the Graduate School of Engineering by August 9 (Fri) 2024. We will adopt the submitted Test Date Scores as the official score.

<table>
<tr><td colspan="2"></td><td><u>For submitting a TOEIC L&R score</u>
Submit the official score of the TOEIC L&R Public Test. Scores from TOEIC IP, TOEIC Bridge, TOEIC S&W, etc., will not be accepted. Submit by one of the following methods:
1. Register the URL for the Digital Official Score Certificate in the web application system by August 9 (Fri) 2024.
2. Submit the original Official Score Certificate (copies are not accepted) to Department Office, Department of Materials Engineering, The University of Tokyo (7-3-1 Hongo, Bunkyo-ku, Tokyo 113-8656, Japan) to arrive by August 9 (Fri) 2024. When mailing, mark the envelope with "Graduate School Entrance Examination Documents" in red ink.</td></tr>
<tr><td rowspan="2">Written Examinations</td><td>Regular education subjects</td><td>Select one regular education subject from mathematics, physics, and chemistry at the time of application. For Mathematics, 6 questions will be given. Select and answer 3 out of 6 questions. For Physics, 2 questions will be given and answer all of them. For Chemistry, 3 questions will be given and answer all of them.</td></tr>
<tr><td>Fundamentals of materials</td><td>1.
2.
3.
4.

1. Thermodynamics and Kinetics of Materials
(Materials Processing)
2. Structure of Materials
(Chemistry Crystallography Microstructure)
3. Properties of Materials
(Solid State Physics Quantum Mechanics)
4. Mechanics of Materials
(Theory of Elasticity Strength of Materials)
Four problems (one problem each from the above four fields) in total are given. Select two problems and answer them.</td></tr>
<tr><td>Oral Examination</td><td colspan="2">Details will be notified when the examination admission card is issued.</td></tr>
</table>

/ Doctoral Program

TOEFL TOEIC L&R

The Entrance Examination is based on the Foreign Language (English) Examination by submitting the official score of TOEFL or TOEIC L&R, the Written Examination (fundamentals of materials), and the Oral Examination. The contents of the tests are as shown in the table below. However, for those who have completed or are expected to complete the master's program in the Department of Mining and Metallurgy, Department of Metallurgical Engineering, Department of Materials Science, and Department of Materials Engineering, the Foreign Language (English) Examination and the Written Examination will be omitted. For

those who have completed or are expected to complete the master's program at the other departments of Graduate School of Engineering, the University of Tokyo, the Foreign Language (English) will be omitted. The problems in the Written Examination are the same as those for the Master's course.

In the Environment Management Engineering Course, we are recruiting company employees who wish to be enrolled on the theme of environmental management and related research. (Refer to the attached table at the end for the possible supervisors)

Foreign Language (English) Examination	TOEFL TOEIC L&R 2022 9 TOEFL TOEFL iBT TOEFL iBT Home Edition 7(2025) TOEFL 2024 8 9 Test Date Scores TOEIC L&R TOEIC L&R TOEIC IP TOEIC Bridge TOEIC S&W 1. URL 2024 8 9 WEB 2. 113-8656 7-3-1 2024 8 9 Submit the official score of TOEFL or TOEIC L&R. Applicants must choose which score to submit at the time of application, and changes to this choice will not be allowed after the application period. Only scores from tests with a Test Date in September 2022 or later are valid. Applicants should plan ahead to allow ample time for taking a test before applying for the Entrance Examination. For submitting a TOEFL official score Submit the official score of either the TOEFL iBT or the TOEFL iBT Home Edition. See the website of the Graduate School of Engineering "Admissions Information for Graduate School", "Application Guidelines", and "Notice regarding Foreign Language (English) Examinations". Applicants must submit the score to the Graduate School of Engineering by August 9 (Fri) 2024. We will adopt the submitted Test Date Scores as the official score.

		For submitting a TOEIC L&R score Submit the score of the TOEIC L&R Public Test. Scores from TOEIC IP, TOEIC Bridge, TOEIC S&W, etc., will not be accepted. Submit by one of the following methods: 1. Register the URL for the Digital Official Score Certificate in the web application system by August 9 (Fri) 2024. 2. Submit the original Official Score Certificate (copies are not accepted) to Department Office, Department of Materials Engineering, The University of Tokyo (7-3-1 Hongo, Bunkyo-ku, Tokyo 113-8656, Japan) to arrive by August 9 (Fri) 2024. When mailing, mark the envelope with "Graduate School Entrance Examination Documents" in red ink.
Written Examination	Fundamentals of materials	1. 2. 3. 4. 1. Thermodynamics and Kinetics of Materials (Materials Processing) 2. Structure of Materials (Chemistry Crystallography Microstructure) 3. Properties of Materials (Solid State Physics Quantum Mechanics) 4. Mechanics of Materials (Theory of Elasticity Strength of Materials) Four problems (one problem each from the above four fields) in total are given. Select two problems and answer them.
Oral Examination	Details will be notified when the examination admission card is issued.	

/ Examination Dates and Location

As shown in the table below.

/ Date	/ Time	/ Subject	/ Room
8 26 ( ) Aug 26 (Mon)	13:00 15:30	Regular education subjects Mathematics	4 41 4 42 4 43 4 44 Engineering Building No.4 Lecture Room 41 Lecture Room 42 Lecture Room 43 Lecture Room 44 (subject to change)
8 27 ( ) Aug 27 (Tue)	9:00 11:00	Regular education subjects Chemistry	
	13:00 15:00	Regular education subjects Physics	
8 28 ( ) Aug 28 (Wed)	10:00 12:00	Fundamentals of materials	
8 29 ( ) Aug 29 (Thu)	10:00 15:00 (subject to change)	Doctoral course Oral Examination	
8 30 ( ) Aug 30 (Fri)	9:00 15:00 (subject to change)	Master's course Oral Examination	

/ Notes

(1) 2024 8 23 ( ) 10:00

The examination room will be posted on the Graduate School of Engineering website and Department of Materials Engineering website by 10:00 am on August 23 (Fri) 2024.

(2)

Depending on the results of the examination, admission may not be permitted even if the number of successful applicants does not reach the capacity.

(3)

The applicants for the doctoral program still need to submit the application documents even if the applicant is exempt from taking the Written Examination.

/ Notice for Examination

Applicants must carefully read the "Notice for Examination" attached below.

/ Items to Bring (Fundamentals of Materials)

Bring a **ruler** in addition to the items listed in the "Notice for Examination". Rulers cannot be borrowed on-site. As for the scientific calculator, use the one provided at the examination venue, and do not use your own carried with you.

/ Supervisor Assignment

2024 8 23 17:00 exam@material.t.u-tokyo.ac.jp

2024 9 5 16
2024 9 11 16:00

2024 9 13 17

The supervisor can be selected from faculty members affiliated with the Graduate School of Engineering, the Institute of Industrial Science, the Research Center for Advanced Science and Technology. The names of the possible supervisors, affiliations, research fields, and the capacities of Master's students (subject to change) are shown in the attached table at the end.

Applicants for the Master's course must specify the first-, second-, and third-choices of supervisor on the application form. Priority in assigning supervisors will be given to the applicant's preference, and the examination scores will be used as reference data. Due to the limited capacity of Master's students, the wishes sometimes may not be met. The preference of faculty members who wish to be supervised which is submitted in the application form for Master's Program can be changed only once after application. Those who wish to change must submit "Notification of Change Master's course " at the end by email attachment to exam@material.t.u-tokyo.ac.jp by 17:00 (JST) Friday, August 23, 2024.

Applicants for the Doctoral course must specify the first-choice of supervisor on "Questionnaire sheet Doctoral Course ". Applicants for the Doctoral course should contact the possible supervisor of interest in advance and gain approval for the supervision by the time the application is submitted.

The results of the first assignments to the supervisors will be posted on the Department website by around 16:00 (JST) on Sep 5 (Thr) 2024 (subject to change). The second assignments to the supervisors for the successful applicants who are not assigned in the first assignment round will be held online from 16:00 (JST) on Sep 11 (Wed) 2024. Instruction to access the online second assignment session will be posted on the Department website, together with the first assignment result. Those who do not participate the online second assignment session will be considered to decline the assignment. The results of the second assignments will be posted on the Department website by around 17:00 (JST) on September 13 (Fri) 2024 (subject to change).

/ Guidance on Entrance Examinations

2024 4 20 13:00
The first guidance on entrance examinations and introduction of laboratories (online)
13:00 (JST) –, April 20 (Sat) 2024

2024 4 26 13:30
The second guidance on entrance examinations in Komaba Research campus
13:30 (JST) –, April 26 (Fri) 2024

2024　5　18　　13:00
The third guidance on entrance examinations in Hongo campus
13:00 (JST) –, May 18 (Sat) 2024

Details of the guidance will be posted on the Department website.

/ Department of Materials Engineering website
https://www.material.t.u-tokyo.ac.jp/

/ Supervisors in Graduate School
https://www.material.t.u-tokyo.ac.jp/faculty/graduate/

/ Contact Information

Department Office, Department of Materials Engineering, The University of Tokyo
TEL: 03-5841-7091, E-mail: exam@material.t.u-tokyo.ac.jp

Notification of Change　Master's course

2024　8　23

17:00　exam@material.t.u-tokyo.ac.jp

The preference of faculty members who wish to be supervised which is submitted in the application form for Master's Program can be changed only once after application. Those who wish to change must submit this Notification of Change　Master's course　by email attachment to exam@material.t.u-tokyo.ac.jp by 17:00 (JST) Friday, August 23, 2024.

(Name in full)		(Examinee ID number)	

I notify my change as below.

1　3　　1　　2　　3

Write numbers from 1 to 3 to the right of the name(s) of faculty members (after change) to whom you wish to be supervised (1: first choice, 2: second choice, 3: third choice).

Faculty member	Preferred rank	Faculty member	Preferred rank	Faculty member	Preferred rank
Abe, Yamaguchi, Sasaki		Ichiki, Takehara, Matsumoto		J. Inoue	
Uchida, Toyoshima		Ejima		Edagawa, Tokumoto	
Okabe, Ouchi		Kondo		Sakata	
Shibata, Seki		Shibuta		Shimogaki	
Shiraiwa		Daigo		Nagashio	
Nambu		Machida		Matsuura	
Mizoguchi		Miyata, Naito		Yagi	
H. Yoshida, Masuda		R. Yoshida		Watanabe	
Hoshino					

2024　10

2025　4

The University of Tokyo has established the "The University of Tokyo Security Export Control Regulations" in accordance with Japan's "Foreign Exchange and Foreign Trade Act", and rigorously implements security export control for potential students before and after their enrollment on the basis of these regulations. In particular, pre-enrollment screenings are mandatory for all international students and also for Japanese students in certain circumstances. If you change your preferred supervisor, please be aware that applicants who wish to enroll in October 2024 may be delayed to enroll in April 2025 due to the re-examination of the pre-enrollment screenings.

Questionnaire sheet　Doctoral course

This questionnaire sheet must be submitted with the application form.

Department of Materials Engineering, Graduate School of Engineering, The University of Tokyo

(Name in full)		(Examinee ID number)	
(Graduated university)	(Names of university, faculty and/or department)		
(Graduate school in which master's degree was completed)	(Names of graduate school, faculty and/or department)		
(Contact)	(Residence address and telephone number)	TEL:	

Leave blank the Examinee ID number.

Enter the name of the faculty member(s) to whom you wish to be supervised.

☐ ✓

Applicants for the Doctoral program should contact the possible supervisor of interest in advance and gain approval for the supervision by the time the application is submitted. Please place ✓ in ☐ below after obtaining the approval.

☐

☐ Yes, I contacted the faculty member written above and obtained the approval for supervision after passing the entrance examination and admitting the graduate school.

令和7(2025)年度 東京大学大学院工学系研究科入学試験受験者心得

１．試験日

令和 6(2024)年 8 月 26 日(月)～8 月 30 日(金)

(各科目等の試験時間・場所の詳細は、志望専攻の「専攻入試案内」を参照してください。)

２．試験場

東京大学大学院工学系研究科(東京都文京区本郷 7-3-1)試験場案内図参照

(1)各自が受験すべき科目の試験室については、令和 6(2024)年 8 月 23 日(金)午前 10 時までに工学系研究科 Web サイト及び各専攻 Web サイトに掲示するので、**予め試験室を確認してください。**

(2)受験者は、試験開始時刻の 20 分前までに所定の試験室に入室してください。なお、専門科目(専門学術)試験については、専攻において別に指示することがあります。

(3)試験室では、机の上に貼付してある受験番号が、受験票のものと同一であることを確認して、着席してください。

(4)試験開始時刻に遅刻した場合は、試験開始時刻後 30 分以内の遅刻に限り、受験を認めます。

３．試験当日に持参するもの

(1)受験票(試験当日に受験票を持参し忘れた場合は、試験室に行き、監督者に申し出てください。)

(2)黒色鉛筆(又はシャープペンシル)、消しゴム、鉛筆削り(卓上式は不可)、シャープペンシルの芯、時計(計時機能だけのもの)。

(3)専門科目(専門学術)試験の携行品については、専攻において別に指示することがあります。

(4)その他、受験票交付時に指示するもの。

４．一般教育科目(一般学術)試験時の留意事項

(1)監督者の指示に従ってください。

(2)試験の際、不正行為を行わないでください。不正行為を行った場合は、その場で受験の中止と退室が命じられ、それ以後の受験はできません。また、受験した入学試験のすべての科目の成績を無効とします。

①　次のことをすると警告なく直ちに不正行為となります。

a. 試験時間中に、携帯電話やスマートフォン、腕時計型端末、電子辞書、ＩＣレコーダ等の電子機器類や電卓・定規・分度器・コンパス等の補助具を使用すること。

b. 受験票、解答用紙へ故意に虚偽の記入（受験票に本人以外の写真を貼ることや解答用紙に本人以外の名前・受験番号を記入するなど）をすること。

c. カンニング（カンニングペーパー・参考書・他の受験者の答案等を見ること、他の人から答えを教わることなど）をすること。

d. 他の受験者に答えを教えること、カンニングの手助けをすること。

e. 試験時間中に、問題用紙を試験室から持ち出すこと。

f. 解答用紙を試験室から持ち出すこと。

g. 「解答をはじめてください。」の指示の前に、問題冊子を開くこと、解答を始めること。

h. 「解答をやめてください。」の指示に従わず、筆記具や消しゴムを置かないこと。

②　上記①以外にも、次のことをすると不正行為となることがあります。不正行為になった場合の取扱いは、上記①と同様です。

a. 試験時間中に、携帯電話やスマートフォン、腕時計型端末、電子辞書、ＩＣレコーダ等の電子機器類や電卓・定規・分度器・コンパス等の補助具をかばん等にしまわず、机等に置くこと、身に付けていること及び手に持っていること。

b. 試験時間中に携帯電話やスマートフォン、時計等の音（着信・アラーム・振動音など）を長時間

鳴らすなど、試験の進行に影響を与えること。

c. 机等に何かを書き付けること。

d. 試験に関することについて、自身や他の受験者を利するような虚偽の申し出をすること。

e. 試験場において他の受験者の迷惑となる行為をすること。

f. 試験場において試験監督者等の指示に従わないこと。

g. その他、試験の公平性を損なうおそれのある行為をすること。

(3)試験時間中の退室は、解答を終えた場合でも、また、試験を放棄する場合でも認めません。

(4)試験時間中、受験票を常に机上に置いてください。

(5)解答用紙及び問題冊子は、持ち帰らないでください。

(6)監督者の指示があるまで退室しないでください。

(7)マスクについては、個人の主体的な選択を尊重し、着用は個人の判断に委ねることを基本とします。

５．博士課程第２次試験

博士課程第２次試験は、原則として令和 7(2025)年１月中旬から２月上旬とし、期日・場所は追って通知します。

６．その他

(1)合格者は、令和 6(2024)年９月５日(木)午後４時頃、本研究科 Web サイトに掲示します。
(https://www.t.u-tokyo.ac.jp/soe/admission/general-fee?hsLang=ja)

(2)電話、FAX、メール等による合否の照会には応じません。

(3)出願以後において、メールアドレス、電話番号等連絡先に変更が生じた場合には、速やかに届け出てください。

(4)問合せ先：東京大学大学院工学系研究科学務課大学院チーム
電話 03-5841-7747、6038
※質問や問い合わせは、緊急の場合を除き、本研究科 Web サイトにある「お問い合わせ窓口―入試関係（大学院)」からお問い合わせください。
https://www.t.u-tokyo.ac.jp/contact

Notice for Examination
~The 2025 Master's / Doctoral Program Graduate School of Engineering, the University of Tokyo~

1. Examination Dates

Examinations will be held from August 26 (Monday) through August 30 (Friday), 2024.
(For details on times and location of the examination subjects, refer to the "Guide to Entrance Examination" of the department you are applying for.)

2. Examination Location

Refer to the "Campus Map for the Examination" [see the attached paper].
(1) The actual place of the examination subjects for applicants will be posted on the School of Engineering website and each department website by 10:00 a.m. on August 23 (Friday), 2024.
Confirm the specified place for the examination subjects beforehand.
(2) Applicants should arrive at the specified place for the examination subjects 20 minutes prior to the scheduled examination time.
For the examination of specialized subjects (専門科目(専門学術)), also refer to notifications from the department you are applying for.
(3) Confirm that the number on your desk is the same as your examinee number and take your seat at that desk.
(4) If you are late for the examination, you will still be allowed to take the examination if it is less than 30 minutes after the start of the examination.

3. Items to Bring

(1) Examination admission card. (*If you forget to bring it on the examination day, go to the examination venue and tell the supervisor about it.)
(2) Black pencils (or black mechanical pencils), an eraser, a pencil sharpener (a desktop type is not allowed), mechanical pencil leads, a watch (watches with functions other than time measurement are not allowed).
(3) For other items to bring for the examination of specialized subjects (専門科目(専門学術)), refer to notifications from the department you are applying for.
(4) Other items as instructed at the time the Examination admission card is issued.

4. Notice during Examination of Regular Education Subjects (一般教育科目(一般学術))

(1) Follow the instructions from the proctor during the examination.
(2) Do not do academic misconduct on the exam. If you do so, you will be ordered to stop the exam and leave the room and you will not be able to continue it. Also, all the exam you have taken will be invalid.

① The following actions will be immediately considered as misconduct behavior without warning.

a. Using your electronic devices such as cellphone/smartphone, smart watch, electric dictionary and IC recorder or stationary goods such as calculator, ruler, protractor and compasses during the examination.
b. Deliberately falsifying any data on your examination admission card or answer sheet (such as using someone else's photo on the examination admission card, writing someone else's examination admission number, etc.)
c. Cheating by using scribe papers or reference books, stealing a glance at an answer sheet of others and being taught an answer by others.
d. Teaching answers to other test takers or asking others to help cheat.
e. Bring your problem booklet outside from your examination room during the exam.
f. Bring your answer sheet outside from your examination room.
g. Open your problem booklet or start answering a problem before hearing the instruction of "Exam begin."
h. Not putting down writing instruments and erasers after hearing "Exam end."

② Beside the descriptions ①, the following will also be considered as misconduct behavior.

In that case, we handle the case the same as ①.

a. During the exam, putting your electronic devices such as cellphone/smartphone, smart watch, electronic dictionary and IC recorder or stationary goods such as calculator, ruler, protractor and compasses on the desk, with you or holding it in your hand, instead of putting them away in your bag.
b. Any actions to interrupt the exam, such as ringing a cellphone, smartphone or watch for a long time,

etc.

c. Intentionally marking something on the desk etc.
d. Regarding the exam, any false behavior to benefit yourself or other test takers.
e. Disrupting other test takers at the exam venue.
f. Not following the exam proctor's instructions at the exam venue.
g. Any other acts that may impair the fairness of the exam.

(3) You cannot leave the examination room throughout the examination.
(4) The Examination admission card must be kept on your desk at all times during the examination.
(5) Applicants cannot take home the answer sheets or the problem booklets after the examination.
(6) Do not leave the room until instructed to do so by the proctor.
(7) Regarding the use of masks, we respect your decision. Whether wearing masks or not depends on your judgement basically.

5. The Secondary Examination for Applicants to the Doctoral Program

The secondary examination will be held between mid-January and early February 2025.
Applicants will be advised of Examination dates and locations regarding secondary examinations for the department they are applying for later.

6. Miscellaneous

(1) The Examinee Numbers of successful applicants will be posted on the website of the School of Engineering at approximately 4 p.m. on September 5 (Thursday), 2024.
(http://www.t.u-tokyo.ac.jp/en/soe/admission/general-fee).
(2) The School will not accept telephone calls, fax, e-mail, and other inquiries regarding the results of the examinations.
(3) After the application process is complete, applicants must report immediately in case of change of mail address or telephone number for contact.
(4) Contact: Graduate School Team, Administrative Division, School of Engineering, the University of Tokyo.
Tel:03-5841-7747、6038
※For questions or inquiries, please contact us through the "Contact Us – Inquiries about Admission (Graduate School)" on the Graduate School of Engineering website, except in case of emergency.
https://www.t.u-tokyo.ac.jp/contact

試験場案内（東京大学本郷キャンパス）
Campus Map for the Examination (Hongo campus, the University of Tokyo)

地下鉄利用　Subway

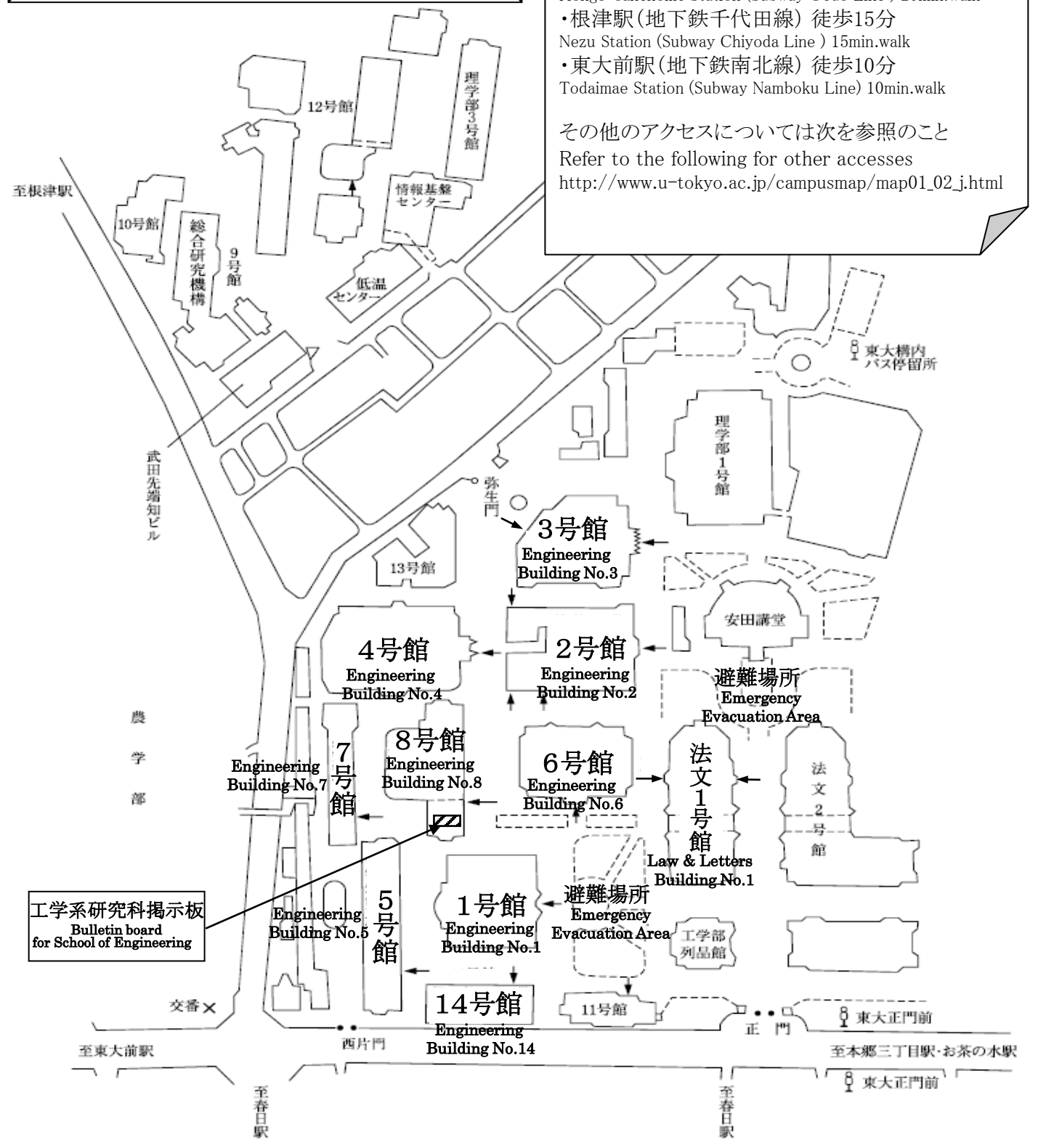
・本郷三丁目駅（地下鉄丸の内線）徒歩20分
Hongo-sanchome Station (Subway Marunouchi Line) 20min.walk

・本郷三丁目駅（地下鉄大江戸線）徒歩20分
Hongo-sanchome Station (Subway Oedo Line) 20min.walk

・根津駅（地下鉄千代田線）徒歩15分
Nezu Station (Subway Chiyoda Line) 15min.walk

・東大前駅（地下鉄南北線）徒歩10分
Todaimae Station (Subway Namboku Line) 10min.walk

その他のアクセスについては次を参照のこと
Refer to the following for other accesses
http://www.u-tokyo.ac.jp/campusmap/map01_02_j.html



教員名	専門分野	修士課程最大受入人員[1]	専門分野内容説明
所属部局			
教授 阿部 英司 准教授 (特定客員大講座) 山口 正剛 講師 佐々木 泰祐	金属物性工学	2	軽量構造材料として重要な Al 合金や Mg 合金の特性は，微量添加した元素の分布，析出相などの微細構造に強く依存する。本研究室では，最先端の電子顕微鏡法を用いた微細構造解析に基づき，合金特性と微細構造の関連性の解明を行っている。 主な研究テーマは以下の通り。 (1) 時効硬化型 Al 合金，Mg 合金の微細構造・組織評価 (2) 長周期構造(LPSO)相をベースとする最先端 Mg 合金 (3) 希薄 Al 合金における添加元素クラスタリング挙動の解明 (4) 複雑化合物析出による高強度 Mg 合金の作成 (5) 水素吸蔵超格子化合物の合成と構造評価 (6) 超高分解能 STEM による精密構造解析法の開発 (7) 新しいタイプの Al 基準結晶の構造解析
工学系研究科			
教授 一木 隆範 講師 竹原 宏明 准教授 (特定客員大講座) 松元 亮	ナノバイオデバイス	3	半導体産業で培われた高度なナノ・マイクロファブリケーション技術と異種材料・デバイス統合化技術を基盤として，高機能バイオデバイス・システム技術の進展が著しい。本研究室は当該技術の研究を先導し，その医療・ヘルスケア領域での本格的な社会実装に向けて革新的なナノバイオ計測技術や生体情報センシングシステムの研究開発を行っている。 最近の研究テーマは以下の通りである。 ・ナノ粒子分析，操作のためのマイクロ流体デバイス開発 ・深層学習を利用したナノ粒子形態推定手法の研究 ・エクソソーム製剤等の新規モダリティ医薬品の品質評価 ・低侵襲診断のためのマイクロニードルセンサの開発 ・マイクロフルイディクスによる体液診断システムの開発 ・生体高分子ナノファイバーの作製と感圧センサ応用 ・バイオセンシングのための導電性高分子材料の研究 ・体内診断・治療を目指した未来型医療エレクトロニクス
工学系研究科			
教授 井上 純哉	材料強度学	2	金属材料では従来，内在する微細組織や析出物など，ナノからミクロに亘る様々なスケールの組織形態を制御することで多くのバライエティーに富んだ材料特性が実現されてきた。本研究室では，鉄鋼材料をはじめとする金属材料や，金属間化合物などを対象に，この様な材料の組織形態と力学特性の関連を，数値シミュレーションや SEM-EBSP・ナノインデンター・中性子回折等を用いた解析とデータ駆動科学の融合により明らかにし，従来にない特性を有する新たな材料の開発を行っている。 最近の研究テーマは次の通りである。 (1) データ駆動型手法による組織形成挙動の解明 (2) ホログラフィック顕微鏡によるせん断型変態の直接観察 (3) せん断型変態組織の高解像度局所変形挙動の解明 (4) Phase-Field 法を用いたせん断型変態挙動の解明 (5) 結晶塑性有限要素法を用いた高強度鋼の特性予測
生産技術研究所			

教員名	専門分野	修士課程最大受入人員[1]	専門分野内容説明
所属部局			
教授 内田 建 講師 豊島 遼	ナノ電子デバイス／ナノ電子材料工学	3	あらゆるモノがインターネットに接続されるモノのインターネット(Internet of Things: IoT)の時代が到来している。本研究室では，IoT 社会を実現するために不可欠である a) 低エネルギーなセンサや b) 情報処理のための電子デバイスの創製を目指して，電子材料がナノスケールにまで微細化した時の物性の探求と，ナノ電子材料の機能を最大限に引き出すための素子化・集積化技術の開発を行っている。 最近の研究テーマは以下の通り。 (1) 触媒金属ナノシートによる分子センサ (2) 超分子および酸化物半導体を用いた分子センサ (3) ナノスケール MOS トランジスタのデバイス物理 (4) ナノ電子材料における熱輸送特性の究明 (5) ナノ電子材料におけるキャリア輸送特性の究明 (6) 絶縁膜/半導体界面における電子フォノン散乱の解析 (7) 量子コンピュータ・エレクトロニクス
工学系研究科			
准教授	バイオ 高分子材料	2	生物模倣技術（バイオミメティクス）は近年の分子生物学とナノテクノロジーの進展に相俟って新たな局面を迎えている。蓄積されてきた生体分子の構造とそこから発現する機能の相関情報は，人工の分子をデザインする上で有益な設計指針となる。バイオに学ぶ分子デザインに加えて，最新のナノ・バイオテクノロジーを併用することで，環境問題や先端医療に資する機能性高分子材料の創製を目指している。 最近の主要な研究テーマは次の通りである。 (1) ポリフェノールにヒントを得た抗酸化ポリマーの精密重合 (2) 海水中で自己修復するポリマー材料の分子デザイン (3) ホヤの接着機構に学ぶ高強度水中接着ポリマーの開発 (4) 芽胞形成を模倣した1細胞コーティング技術の開発 (5) 薬物送達へ向けた生体ナノ粒子の表面エンジニアリング
工学系研究科			
教授 枝川 圭一 講師 徳本 有紀	材料強度 物性学	4	金属，半導体等の結晶固体材料およびアモルファス金属，準結晶等の非結晶材料の強度物性に関する研究，準結晶の諸物性に関する研究，トポロジカル絶縁体中転位の一次元電気伝導に関する研究を行っている。 具体的な研究テーマは，以下の通りである。 (1) (2) (3) (4) (5) (6) トポ
生産技術研究所			

教員名	専門分野	修士課程最大受入人員[1]	専門分野内容説明
所属部局			
教授 岡部 徹 講師 大内 隆成	循環資源・材料プロセス工学 （環境マネジメント工学コース）	3	チタン，ニオブ，タンタル，希土類金属（REMs）などのレアメタルや，白金族金属（PGMs）などの貴金属の製造およびリサイクルを目的とした環境調和型の新規プロセスの開発を行っている。最近の研究テーマは次の通りである。 (1) Ti の新製造技術，リサイクル技術の開発 (2) レアメタル（REMs, Nb, Ta, Sc, Ga, W など）の高効率製造法とリサイクルプロセスの開発 (3) 貴金属（Au, Ag, PGMs など）の新規分離法とリサイクル技術の開発 (4) 活性金属（Ca, Mg, Li など)の高効率製造法とリサイクルプロセスの開発 (5) 高温における窒化物・酸化物・塩化物とそれらの複合化合物の熱力学 (6) サブハライド（低級塩化物）の不均化反応の熱力学的解析 (7) 新規めっき技術の開発
生産技術研究所			
教授 近藤 高志	フォトニクス材料学	2	化合物半導体とペロブスカイト型半導体の光機能とその光デバイスへの応用について研究している。我々が独自に開発した III-V 族化合物半導体ヘテロエピタキシャル成長技術を活用したレーザー光波長変換用の非線形光学デバイスの開発と，金属ハライドペロブスカイト型半導体の薄膜形成技術を用いた高効率太陽電池や各種フォトニックデバイスの研究に取り組んでいる。 主な研究テーマは (1) 化合物半導体の副格子交換エピタキシー (2) 高機能波長変換デバイス (3) 金属ハライドペロブスカイト型半導体薄膜・ヘテロ構造 (4) 金属ハライドペロブスカイト型半導体と類似物質の物性 (5) ペロブスカイト太陽電池とフォトニックデバイス (6) 有機反強誘電体のTHz波発生とドメインダイナミクス
先端科学技術研究センター			
	バイオセンシング材料学	2	生命科学，医療，創薬など様々なライフサイエンスを支える工学技術として，新たなバイオセンシング技術の提案と研究開発を行う。特に，機能性の無機・有機材料の特徴を活かし，DNA などの生体分子から細胞といった高次の機能を電荷，質量，屈折率，電流，などの様々な物理量により定量的に計測する材料と技術を探求する。 (1)「移植前診断」のための細胞センシング技術 (2) 細胞代謝活性センシング技術 (3) 完全非侵襲グルコースセンシングに関する研究 (4) 癌マーカーバイオセンシングの基礎検討 (5) バイオセンシングのためのシグナル変換界面材料の創製 (6) 検出デバイスに特化したバイオセンシング技術
工学系研究科			

教員名	専門分野	修士課程最大受入人員[1]	専門分野内容説明
所属部局			
教授 柴田 直哉 講師 関 岳人	電子顕微鏡 材料学	3	新規原子分解能電子顕微鏡手法開発と材料界面研究を車の両輪として，材料界面機能発現メカニズムの本質的解明を目指した以下の研究・開発を行っている。 (1) 新規低ドーズ原子分解能電子顕微鏡法の開発 (2) 原子分解能電磁場観察手法の開発 (3) 原子分解能電子顕微鏡像形成メカニズムの理論解析 (4) 原子分解能磁場フリー電子顕微鏡の開発 (5) セラミックス界面原子・電子構造解析 (6) 半導体デバイス界面電場定量観察手法の開発と応用 (7) 超高分解能磁性材料構造解析 (8) 磁気スキルミオンの構造観察及び制御 (9) 電子顕微鏡オペランド計測法の開発と応用 (10) 原子分解能 3 次元構造観察手法の開発 (11) 超低ドーズ STEM 観察手法の開発と応用 (12) 電磁鋼板粒界の原子構造解析 (13) スピントロニクスデバイスの界面磁気・磁区構造解析
工学系研究科			
教授 澁田 靖	マテリアル モデリング	2	近年の計算機性能の飛躍的向上により，数値解析手法で取り扱える時空間スケールが大幅に広がってきた。反応素過程の局所解析から，数千～数万原子の協力現象としての相変化・変態に至る広範囲な現象について，マルチスケール数値計算の立場から理解し，材料最適設計への貢献を目指している。 最近の主な研究トピックスは以下の通りである。 (1) カーボンナノチューブ・グラフェン生成メカニズムの解明 (2) 核生成・凝固・粒成長過程の原子論的理解 (3) 金属固液界面物性およびキネティクスの解明 (4) スパコン・GPGPU を用いた数値計算の大規模化 (5) データ同化手法による材料組織生成予測
工学系研究科			
教授 霜垣 幸浩	デバイス プロセス工学	3	半導体デバイスや高性能複合材料等を対象とし，ナノスケール構造制御を実現するプロセス設計，ならびに，材料システム開発に関する研究を展開している。CVD（化学気相蒸着法）や ALD（原子層成長法）などの薄膜作製プロセス，ALE（原子層エッチング）などのデバイス加工技術について，その反応機構や速度論を実験的に解析するとともに，量子化学計算を活用して詳細を理解し，デバイス性能の大幅な向上に貢献するプロセス提案を行っている。 主要テーマは下記の通りである。 (1) ALD（原子層成長法），ALE(原子層エッチング)を活用した次世代デバイス製造プロセスの高度化 (2) 高信頼性次世代 ULSI 多層配線システムの研究 (3) 次世代航空機エンジン用 SiC/SiC_f-CMC(セラミックス基複合材料)を合成する CVI（化学気相含侵法）プロセスの開発と最適化 (4) モデル触媒構造を利用した可視光応答型 CuO/TiO_2 光触媒の開発
工学系研究科			

教員名	専門分野	修士課程最大受入人員[1]	専門分野内容説明
所属部局			
講師 白岩 隆行[2]	信頼性材料工学	2	次世代の構造材料について，損傷や破壊のメカニズム解明，力学特性の予測モデルの構築を行っている。微視組織解析と破壊力学，情報学的アプローチを組み合わせて，材料中の微視変形を動的かつ定量的に捉えることで，マクロな力学特性に結びつけることを目指している。また身の回りで使用されている構造材料について，効率的で正確な材料診断を行うための構造ヘルスモニタリング手法の開発に取り組んでいる。 主な研究テーマを以下に示す。 (1) データ科学手法による材料の構造-特性連関の解析 (2) 材料製造プロセスの信頼性向上(3D プリンタ) (3) 航空機材料(Ni 合金，Ti 合金，Mg 合金，SiC/SiC 複合材料)の疲労機構の解明 (4) 自動車材料(鉄鋼，Al 合金，Mg 合金)の腐食挙動の解析 (5) ナノ積層金属材料の力学特性解明
工学系研究科			
准教授 醍醐 市朗	環境システム (環境マネジメント工学コース)	2	2050 年の脱炭素の達成を含め，社会的急務となっている持続可能な社会への移行に際して，材料を使わず達成することは難しいと考えられる。一方，現在の材料の使い方は持続可能な形態になっていない。そこで，本研究室では，持続可能な資源・エネルギー利用を目指した物質ストック・フローモデルを構築している。 主な研究テーマは，以下の通りである。 (1) モデルに必要な物質のストック・フローの動態の解明 (2) 最適化に必要な持続可能性指標の開発 (3) 材料高機能化の定量評価手法の構築 (4) 材料リサイクルの評価方法の確立 (5) 材料リサイクルにおける不純物コンタミの実態解明 これらの目的に向けて，現象の数理モデル化によるシミュレーション，deep learning を用いた新たな解析手法の開発，今まで観測できなかったデータを収集するための試験やフィールド調査など，種々のアプローチを合わせて用いることで実施している。
先端科学技術研究センター			
教授 長汐 晃輔	ナノカーボンデバイス工学	2	グラフェンに代表されるナノカーボン材料及び層状 2 次元材料に特化して次世代を担う電子/光デバイスの実現を目指している。Si の反転層での 2 次元電子系と異なり，理想的な 2 次元系であり量子効果が顕著になる一方で，他の材料との界面の影響が電子の輸送特性に大きく影響する。この界面特性を制御することで電子デバイス特性の向上を目指している。また，電子物性の異なる様々な層状物質との複層化により，既存のヘテロエピ技術とは異なる分子間力による原子レベルで明確な界面における機能発現を狙っている。 主要な研究テーマは以下の通りである。 (1) ウエハースケールでの2次元 FET の集積化技術構築 (2) 複層化界面を利用したトンネルデバイスの輸送特性評価 (3) 反転対称性の破れた層状物質の成長及びバルク光起電力発電 (4) 原子層パワー半導体の開拓
工学系研究科			

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教員名	専門分野	修士課程最大受入人員[1]	専門分野内容説明
所属部局			
准教授 南部 将一	材料組織工学	2	鉄鋼材料をはじめとする金属材料では，材料の組織と特性は非常に密接な関係にあり，様々な材料プロセスによって材料組織がどのように発現し変化するかを理解して制御することが，次世代の材料を考える上できわめて重要である。 本研究室では，鉄系材料を中心に，ナノ組織からミクロ・マクロ組織にわたって材料組織の形成過程と形成の支配因子を実験や数値シミュレーション，微視的組織解析から解明し，相変態や粒成長，晶析出の制御に，複合化や複相化，界面制御などを重畳して，新たな材料組織制御のシーズ導出に取り組む。さらにナノ・ミクロ組織の力学的特性はじめ材料組織と特性の関係の評価を加え，新たな金属系の材料創製を目指す。主な研究課題は，以下の通りである。 (1) 次世代複層・複合型鉄鋼材料の開発およびその力学特性の解明 (2) 鋼の変位型相変態機構の解明と組織制御 (3) 新規異種金属接合法の開発およびヘテロ界面接合機構の解明
工学系研究科			
教授 町田 友樹	ナノ電子物性	2	グラフェン・遷移金属ダイカルコゲナイド・六方晶窒化ホウ素・二次元超伝導体・層状強磁性体・トポロジカル絶縁体など，様々な物性の二次元結晶を原子層単位で組み合わせてファンデルワールス接合を作製し，既存の材料系ではありえない特異な物性や物理現象の観測を目指す。将来の電子デバイスおよび光エレクトロニクス応用を念頭に，サイエンスおよびエンジニアリングの両面で研究を推進する。 (1) ファンデルワールスヘテロ構造における量子物性 (2) グラフェンにおける量子輸送現象 (3) 二次元結晶のツイスト積層による新規物性発現 (4) 複合原子層を用いたオプトエレクトロニクス応用 (5) ファンデルワールス超格子の作製技術構築
生産技術研究所			
准教授 松浦 宏行	高温プロセス物理化学	2	高品質・機能性マテリアルの持続的製造を可能とする高温プロセスの開発とその物理化学的理解が本研究室のテーマである。下記のようなテーマを通じ，高度資源循環システム，消費エネルギー削減技術，あるいは高機能マテリアルを生み出す新奇プロセスの開発を目指す。 1.金属製精錬プロセスの高機能化，省エネ・省資源化 ・鉄鋼製錬プロセスにおけるバイオマス活用可能性 ・超高純度鉄鋼材料向け二次精錬プロセス開発 ・塩化亜鉛系溶融塩の精製反応の物理化学 2. 工業副産物の高度リサイクル技術 ・鉄鋼スラグを用いた環境修復材料の創製とその機構解明 ・製鋼スラグからの鉄・りん同時回収技術開発 3. 鉄鋼材料高機能化を目指した介在物制御技術 ・二次精錬～鋳造プロセスでの介在物制御の物理化学 ・加工工程での介在物制御を通じた鋼材組織の創出・制御
工学系研究科			

教員名	専門分野	修士課程最大受入人員[1]	専門分野内容説明
所属部局			
教授 溝口 照康	ナノ物質設計工学	3	本研究室では第一原理計算，機械学習，透過型電子顕微鏡を複合利用し，物質の構造と機能の相関性を調べている。 半導体や，セラミックス，二次元化合物，触媒材料などの多様な物質を研究対象としており，機能が発現するメカニズムを原子・電子レベルで理解し，「物質設計」を実現することを目指している。 具体的には以下のような研究を行っている。 (1) 二次元化合物・層間化合物の新規物性開拓 (2) 機械学習と計測を組み合わせた新手法開発 (3) 格子欠陥インフォマティックス分野の開拓 (4) 物質における構造機能相関の解明
生産技術研究所			
教授 宮田 完二郎 講師 内藤 瑞	生体機能材料学	3	本研究室では，マテリアル工学に基づいて新たなナノ医薬に関する研究を行う。具体的には，高分子材料や無機ナノ材料の精密構造設計を通じて，がんや特定の疾患部位に薬物・バイオ医薬を選択的に送り届けるデリバリーシステムを創製する。 主な研究課題 (1) 難治がん，脳，および筋肉を標的化するナノ医薬の開発 (2) RNA ワクチンの開発に資するナノバイオ材料の設計 (3) 核酸医薬治療を実現するための新規材料設計 (4) 新規生体適合性機能材料の分子設計
工学系研究科			
准教授 八木 俊介	エネルギー貯蔵材料工学	3	持続可能な社会の実現のためには，限られたエネルギー資源を効率的に利用できるプロセスの構築とともに，太陽光や風力などの再生可能エネルギーによる発電や電力貯蔵分野における技術革新が必須である。本研究室では，上記の目的において特に重要な課題である電気エネルギーの高効率利用技術の開発を目指し，エネルギー貯蔵・変換材料の研究や，電気化学的手法を用いた機能性材料合成プロセスの研究を行っている。 主な研究課題 (1) 多価イオンをキャリアに用いる次世代蓄電池用材料の研究 (2) 電気化学触媒の活性発現メカニズムの解明とエネルギー変換への応用 (3) 二酸化炭素の電気化学還元触媒の研究 (4) 電気化学的操作を用いた防食技術の研究
生産技術研究所			

教員名	専門分野	修士課程最大受入人員[1]	専門分野内容説明
所属部局			
教授 吉田 英弘 講師 増田 紘士	構造セラミック材料学	4	構造セラミック材料の機械特性は，結晶粒界や界面といった局所領域における原子配位や化学組成に強く依存しており，さらに電磁場を始めとする外部場によって大幅に変化することが明らかになってきた。本研究室では，粒界における微細構造や物質輸送の制御に基づく構造セラミック材料の特異な力学応答の発現，また変形・破壊機構と原子間相互作用の理解に基づく新規構造セラミックス材料の開発を目指している。 最近の研究テーマは以下の通り。 (1) 外部場を利用したセラミックスの微細組織制御 (2) 強電場下でのセラミックスの高温変形と破壊 (3) セラミックスの強電場誘起点欠陥構造および機能発現 (4) 特異な異方性組織を有するセラミックスの機械特性 (5) セラミックスの塑性変形・強靭化に関する研究
工学系研究科			
教授 吉田 亮	バイオ材料システム工学	2	生体を手本とし，その機能を代替したり模倣したりする材料・システムを，高分子ゲルを使って人工的に設計・構築することを試みている。 生体は，情報の伝達，物質の輸送，運動や力の創生などが分子レベルでの協調によって起こる究極の材料システムといえる。とくに「細胞（Cell）はゲル（Gel）」であり，その物理化学的な性質において両者はよく似ている。種々のゲルが示す多様な性質の中には，生命の本質に迫る共通かつ普遍的なメカニズムがある。その本質を抽出し巧みに分子設計することで，運動・物質輸送・情報変換／伝達など生命機能に迫るバイオミメティックゲルを人工的に創製し，新規なバイオ材料システムへの応用を目指す。 とくに，心臓のように自律的に拍動するゲル(自励振動ゲル)，高密度修飾された高分子が自発的に周期変動するポリマーブラシ(人工繊毛)や蠕動運動アクチュエータ（人工腸），細胞のような時空間発展をともなう構造変化を起こす機能性ベシクル(人工細胞)，自律的にゾルゲル転移を繰り返す高分子溶液(人工アメーバ)などの作製を行っている。
工学系研究科			
教授 渡邉 聡	計算材料学	2	新規マテリアル・プロセスの設計指針の導出を目標に，マテリアル物性等をシミュレーションで予測する研究とそのための方法論開発を進めている。現在の主な研究題目は以下の通り。 (1) 新規情報デバイス・エネルギーデバイスの探索を念頭に置いたナノ構造の電子状態，フォノン状態，およびこれらに関連した物性のシミュレーション (2) 抵抗変化素子や全固体電池等をターゲットとしたナノ構造中の反応素過程及びイオン伝導特性シミュレーション (3) 上記(1)，(2)を高速かつ信頼性高く行うための機械学習原子間ポテンシャルの開発 (4) 原子・電子レベル計算と情報学的・統計学的手法とを組み合わせた材料物性解析および材料設計 (5) 上記テーマをはじめ，既存の方法論で対応できない課題に応えるための新規計算方法論およびプログラムの開発
工学系研究科			

教員名	専門分野	修士課程最大受入人員[1]	専門分野内容説明
所属部局			
教授（特任） 星野　岳穂	基盤材料 マネジメント 工学 （環境マネジメント工学コース）	2	鉄鋼，アルミニウム，銅等の基盤金属材料が，地球規模の環境・資源にライフサイクル（生産，消費，廃棄，リサイクル）でどれほど負荷を与えているかを客観的・定量的に分析する手法（数理モデルの構築）の研究，素材のリサイクルを考慮した LCA 分析を進めている。また，金属の合金添加元素レベルでのマテリアルフロー分析を行っている。 主な研究テーマは，以下の通りである。 (1) 金属材料のリサイクルを考慮した LCA 分析手法の構築 (2) 金属材料の添加元素のマテリアルフローの分析手法の構築，混入する不純物元素の将来濃化予測 (3) 脱炭素社会への転換による基盤材料の利用の持続可能性（クリティカリティ：供給安定性）の将来予測 これらのテーマを進めるにあたっては，材料工学，物質フロー分析，確率・統計学等の理論，熱力学の知識を組み合わせることが必要となる。研究成果を政府・産業界に提言し，持続可能な金属素材の利用，資源循環型社会の枠組み構築の実現のための基盤マテリアル利用の今後の方向性を打ち出す。
工学系研究科			

Name	Research Field	Capacity of Master's Students[1]	Detail and Research Topics
Affiliation			
Professor Eiji Abe Associate Professor Masatake Yamaguchi Lecturer Taisuke Sasaki	Physical Metallurgy	2	Mechanical properties of Al alloys and Mg alloys, which are important as lightweight structural materials, strongly depend on the microstructure such as the precipitation phase formed by the trace elements. In our laboratory, we investigate the structure-property relationship of the alloys based on microstructure analysis using advanced electron microscopy. The main research themes are as follows. (1) Microstructures of age hardening Al and Mg alloys (2) Structure and properties of LPSO-structured Mg alloys (3) Solute-clustering behaviors in dilute Al alloys (4) High strength Mg alloy with complex precipitates (5) Precise structural analysis by ultra-high resolution STEM (6) Machine-learning optimizations of the local structure (7) Structural analysis of a new type Al quasicrystals
School of Engineering			
Professor Takanori Ichiki Lecturer Hiroaki Takehara Associate Professor Akira Matsumoto	Nanobiodevice	3	Based on the advanced nano/micro fabrication technology and heterogeneous material/device integration technology cultivated in the semiconductor industry, high-functional biodevice and system technologies have made remarkable progress. Our laboratory is leading the research on these technologies and is conducting research and development of innovative nano-bio measurement technologies and bioinformation sensing systems for their full-scale social implementation in the medical and healthcare fields. Recent research themes are as follows. (1) Development of microfluidic devices for nanoparticle analysis and manipulation (2) Research on nanoparticle morphology estimation using deep learning (3) Quality evaluation of novel modalities of pharmaceuticals such as exosome-based drug (4) Development of microneedle sensors for minimally invasive diagnostics (5) Development of microfluidics-based body fluid diagnostic systems (6) Development of a pressure-sensitive sensor using biopolymeric nanofibers. (7) Research on conductive polymer materials for biosensing (8) Future medical electronics for in-vivo diagnosis and therapy
School of Engineering			

[1] The capacity of master's students may slightly vary depending on the number of applicants for each supervisor.

Name	Research Field	Capacity of Master's Students[1]	Detail and Research Topics
Affiliation			
Professor Junya Inoue	Mechanics of Materials	2	Enhancement of strength of structural materials meets the requirements in many applications, and especially contributes to the improvement of the resource and energy problem from the body-in-white weight reduction of automobiles. To enhance deformability of structural materials without losing strength, our lab aim to develop a new structural materials with enhanced performance by characterizing defects, deformation, and fracture in structural metals and alloys with a help of data-driven material science. The current research topics are as follow: (1) Data-driven approaches to clarify phase transformation and local deformation behaviors of metals and alloys (2) Uncertainty Quantification in numerical modeling of phase transformation and local deformation behaviors of metals and alloys (3) In-situ nanoscale measurement of surface relief effects of phase transformation and local deformation of metals and alloys by Digital Holographic Microscope
Institute of Industrial Science			
Professor Ken Uchida Lecturer Ryo Toyoshima	Nano Electronics/ Electronic Materials Engineering	3	In the Internet-of-Things (IoT) era, every physical device will be connected to network. In this framework, any physical devices will have sensors that will continuously obtain various kinds of physical as well as chemical information around us. We expect that big data consisting of these sensor outputs will be analyzed with AI and valuable information will be extracted to improve our quality of life. In our group, low-energy sensors and information processing devices have been developed by pursuing physics of nano-materials and nano-devices. Recent research topics are as follows. (1) Metal nano-film sensors for breath diagnosis (2) Thermal transport analysis of nano-meterials for low-energy sensors (3) Electron-phonon interactions at the interface of insulator and semiconductor (4) Supramolecular sensors (5) Information processing devices beyond von Neumann architecture (6) CMOS electronics for quantum computing
School of Engineering			

[1] The capacity of master's students may slightly vary depending on the number of applicants for each supervisor.

Name	Research Field	Capacity of Master's Students[1]	Detail and Research Topics
Affiliation			
Associate Professor Hirotaka Ejima	Bioinspired Polymeric Materials	2	With the recent rapid advances in biotechnology and nanotechnology, bioinspired materials science enters a new phase. Novel functional materials can be designed by converting the molecular design principles developed by nature to synthetic systems. We are conducting research projects on bioinspired materials such as: (1) Precise synthesis of polyphenol-inspired antioxidant polymers (2) Molecular design of self-healing polymers in wet environments (3) Tunicate-inspired ultrastrong underwater adhesives (4) Single cell encapsulation via one-step assembly of metal-phenolic network (5) Nanoparticle engineering for therapeutic and diagnostic applications
School of Engineering			
Professor Keiichi Edagawa Lecturer Yuki Tokumoto	Mechanical Properties of Solids	4	Our research is primarily focused on physical properties of crystalline, quasicrystalline and amorphous materials. Current topics are as follows: (1) Plasticity of crystalline, quasicrystalline and amorphous materials (2) Phason elasticity of quasicrystals (3) Thermophysical properties of quasicrystals (4) Synthesis and evaluation of two-dimensional layered quasicrystals (5) Electrical properties of dislocations in topological insulators (6) Enhancement of bulk insulation of topological insulators
Institute of Industrial Science			

[1] The capacity of master's students may slightly vary depending on the number of applicants for each supervisor.

Name	Research Field	Capacity of Master's Students[1]	Detail and Research Topics
Affiliation			
Professor Toru H. Okabe Lecturer Takanari Ouchi	Resource Recovery and Materials Process Engineering Laboratory (Environment Management Engineering Course)	3	We develop novel, environmentally sound production and recycling processes for rare metals (such as titanium, niobium, and tantalum), rare earth metals (REMs), and precious metals (such as platinum group metals (PGMs)). Recent research topics are as follows. (1) Production and recycling processes of Ti. (2) Efficient recovery processes of value-added rare metals, such as REMs, Nb, Ta, Sc, Ga, and W. (3) Separation and recycling processes of precious metals, such as Au, Ag, and PGMs. (4) Energy efficient production and recycling processes of reactive metals, such as Ca, Mg, and Li. (5) Thermodynamic characteristics of nitrides, oxides, chlorides, and their complexes at high temperatures. (6) Thermodynamic assessment of subhalides (low-valance chlorides) disproportionation reactions. (7) Novel electrochemical deposition processes.
Institute of Industrial Science			
Professor Takashi Kondo	Photonic Materials	2	We have been working on optical properties of compound/perovskite semiconductors and their applications to photonic/photovoltaic devices. In particular, we are focusing on semiconductor-based wavelength-conversion materials/devices and newly emerging perovskite solar cells. Research topics include; i) sublattice-reversal epitaxy of III-V compound semiconductors ii) high performance wavelength-conversion devices iii) fabrication of metal-halide perovskite thin films and heterostructures iv) basic properties of metal-halide perovskite-type semiconductors v) perovskite solar cells and photonic devices. vi) terahertz emission and domain dynamics of organic antiferroelectrics
Research Center for Advanced Science and Technology			

[1] The capacity of master's students may slightly vary depending on the number of applicants for each supervisor.

Name	Research Field	Capacity of Master's Students[1]	Detail and Research Topics
Affiliation			
Associate Professor Toshiya Sakata	Biosensing Materials	2	We propose and develop a novel biosensing technology to support life science, medicine, and pharmaceutical discovery. In particular, we explore a measurement system and principle enabling a quantitative detection of biomolecules and cells, focusing on a variety of functional organic/inorganic materials. (1) Design and synthesis of bioelectrical interface for biosensing (2) Development of detection device for biosensing (3) Electrochemical approach for biosensing (4) Study on noninvasive monitoring of small biomarker (5) Cell sensing method for diagnostics before transplantation (6) Elucidation of ionic behaviors at bio/sensor interface
School of Engineering			
Professor Naoya Shibata Lecturer Takehito Seki	Electron Microscopy and Materials Science	3	This laboratory is aiming for opening up a new era in materials science and engineering by fusing advanced electron microscopy development and materials science research. We are strongly promoting the development of new atomic resolution electron microscopy and the research of materials that are extremely important for society and industry such as metals, ceramics, devices, magnetic and organic materials. (1) Development of advanced low-dose atomic-resolution electron microscopy (2) Development of electromagnetic field imaging method by STEM (3) Development of imaging theory for advanced atomic-resolution electron microscopy (4) Development of atomic-resolution magnetic-field-free STEM (5) Atomic-scale characterization of ceramic interfaces (6) Interface electromagnetic imaging in semiconductor devices (7) Atomic-scale characterization of magnetic materials (8) Observation and control of magnetic skyrmions (9) In-situ TEM/STEM studies of materials (10) Development of atomic-resolution 3D imaging STEM (11) Development of ultralow-dose STEM technique (12) Atomic structure characterization of grain boundaries in silicon steel (13) Magnetic structure analysis of spintronics devices
School of Engineering			

[1] The capacity of master's students may slightly vary depending on the number of applicants for each supervisor.

Name	Research Field	Capacity of Master's Students[1]	Detail and Research Topics
Affiliation			
Professor Yasushi Shibuta	Materials Modelling	2	Thanks to the recent progress in high-performance computational environments, range of applications of computational materials science is expanding. Our target using numerical simulations ranges from base materials such as iron and steel to advanced materials such as carbon nanotubes and metal nanoparticles. Current topics are as follows: (1) Metal-catalyzed growth of carbon nanotubes and graphene (2) Understanding of nucleation, solidification, and grain growth from atomistic viewpoint (3) Derivation of thermodynamics and kinetic properties from atomistic approach (4) Large-scale simulation with GPGPU/supercomputer. (5) Data-driven approach to microstructure formation
School of Engineering			
Professor Yukihiro Shimogaki	Device Process Engineering	3	We focus on process design for nanoscale structure control and material system development for semiconductor devices and high-performance composite materials. Thin film fabrication processes such as chemical vapor deposition (CVD) and atomic layer deposition (ALD), and device fabrication techniques such as atomic layer etching (ALE) are experimentally analyzed to understand their reaction mechanisms and kinetics. Quantum chemical calculations are combined with experimental analyses to understand the details of these processes. Novel processes that will contribute to a significant improvement in device performance are proposed based on these studies. The main themes are as follows. (1) Advancement of next-generation device fabrication processes utilizing atomic layer deposition (ALD) and atomic layer etching (ALE) (2) Research on highly reliable next-generation ULSI multilayer interconnect systems (3) Development and optimization of CVI (chemical vapor impregnation) process to synthesize SiC/SiCf-CMC (ceramics-based composites) for next-generation aircraft engines (4) Development of visible light responsive CuO/TiO_2 photo-catalyst using model catalyst structure
School of Engineering			

[1] The capacity of master's students may slightly vary depending on the number of applicants for each supervisor.

Name	Research Field	Capacity of Master's Students[1]	Detail and Research Topics
Affiliation			
Lecturer Takayuki Shiraiwa[2]	Reliable Materials Engineering	2	Our main research topics aim to elucidate the fracture mechanisms of novel structural materials and to develop numerical methods for predicting mechanical properties. By integrating microstructural analysis, fracture mechanics, and an informatics approach, we aim to dynamically and quantitatively capture microscopic deformations in materials and link them to macroscopic mechanical properties. We are also focused on developing a structural health monitoring method for the efficient and accurate diagnosis of structural materials. (1) Materials informatics approach for linking structure-properties of structural materials. (2) Reliability of material manufacturing processes, focusing on additive manufacturing. (3) Corrosion behavior of automotive materials, including steels, Al alloys, and Mg alloys. (4) Fatigue mechanisms in aircraft materials, such as Ni alloys, Ti alloys, Mg alloys, and SiC/SiC composites. (5) Development and study of nano-layered metallic materials.
School of Engineering			
Associate Professor Ichiro Daigo	Sustainable System Analysis (Environment Management Engineering Course)	2	The consideration of material use is essential on the pathway to a sustainable society and net-zero emissions. Material production, use, and waste management encompass mining of exhaustible resources, energy consumption originated from fossil fuels, and material dissipation at the end-of-life, which is not a sustainable material use. In this laboratory, we aim to develop dynamic stock and flow models for environmental sustainability analysis of materials and resources. Specific research topics are; (1) dynamic modeling of material stocks and flows, (2) development of sustainability indicators, (3) methodology for quantifying performance of materials, (4) mechanisms of impurities accumulation during recycling, and (5) their influence on material properties. For achieving these topics, we implement various approaches such as simulation by mathematical modeling of phenomena, development of new analysis methods based on deep learning, field surveys to collect data that does not exist in the world.
Research Center for Advanced Science and Technology			

[1] The capacity of master's students may slightly vary depending on the number of applicants for each supervisor.

[2] The composition of the laboratory may be subject to change.

Name	Research Field	Capacity of Master's Students[1]	Detail and Research Topics
Affiliation			
Professor Kosuke Nagashio	Nano-carbon Device Engineering	2	Our research group studies 2-dimensional material devices for next-generation electronic application. We are trying to extract the inherently high potential of 2D materials and their heterointerfaces in electron devices. The main research topics are as follows; (1) Wafer scale integration of 2D FET (2) Understanding of transport properties at 2D heterointerface and its application to Tunnel FET (3) PVD growth & bulk photovoltaic power generation of 2D materials with inversion symmetry breaking (4) Exploration of 2D power device
School of Engineering			
Associate Professor Shoichi Nambu	Physical Metallurgy	2	In metallic materials based on steels, it is very important for the development of next generation materials to clarify and control the microstructure evolution during their processes due to the strong relationship between the microstructures and the properties. At our laboratory, we endeavor to control the structures of such materials on the nano, micro and macro scale, by forming composites and multilayered structures, while refining their microstructures. Through these techniques, we aim for rapid performance advancement, and to discover new innovative steels and metals. We carry out research on these multiscale structures, identifying and controlling the formation mechanisms and formation origins of phases, composite formation, as well as the bonding of dissimilar materials. The key to these processes into which we are researching is clarifying and controlling the nature of the interfaces between different phases and different materials.
School of Engineering			

[1] The capacity of master's students may slightly vary depending on the number of applicants for each supervisor.

Name	Research Field	Capacity of Master's Students[1]	Detail and Research Topics
Affiliation			
Professor Tomoki Machida	Physics and Applications of 2D Materials	2	We study novel physics of van der Waals heterostructures, which are fabricated by stacking various 2D materials including graphene, hexagonal boron nitride, transition metal dichalcogenides, layered ferromagnets, superconductors, and topological insulators. Our study explores both fundamentals and applications of 2D materials. (1) Quantum transport in van der Waals heterostructures (2) Quantum Hall effect and cyclotron resonance in graphene (3) Novel material properties in 2D materials (4) Optoelectronic devices (5) Robotic assembly of van der Waals superlattices
Institute of Industrial Science			
Associate Professor Hiroyuki Matsuura	High-Temperature Physical Chemistry (Environment Management Engineering Course)	2	Development of the high-temperature sustainable processes to produce high quality and functional materials, and a deeper understanding of its physical chemistry are my target. Through the following research topics, novel processes to create advanced resource circulation systems, energy-saving technology, or advanced functional materials must be realized. 1) Higher performance, energy, and resource-saving of metallurgical processes - Applicability of biomass resources in smelting and refining of steel - Development of secondary refining process for ultra high-grade steel materials - Physical chemistry for refining reactions of $ZnCl_2$-based molten salt 2) Advanced recycling technology of industrial by-products - Creation of environmental restoration materials from steelmaking slag and elucidation of its mechanism - Simultaneous recovery technology of iron and phosphorus from steelmaking slag 3) Control of non-metallic inclusions for the creation of high-performance steel - Physical chemistry and control of inclusions through secondary refining to casting process - Fine-tuning of steel microstructure through inclusion control in physical metallurgy processes
School of Engineering			

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Affiliation			
Professor Teruyasu Mizoguchi	Nano Materials Design	3	We are investigating structure-property relationships of functional materials using DFT simulation, machine learning, and STEM-EELS. To realize "material design", we are studying various functional materials such as semiconductor, electronic oxides, 2D materials, and catalytic materials from the electronic structure viewpoints. Specifically, we are conducting the following research. (1) DFT simulation and machine learning of 2D materials (2) Application of machine learning for materials characterization (3) Investigation of lattice defect by combining with machine learning (4) Structure-property relationships of functional materials
Institute of Industrial Science			
Professor Kanjiro Miyata Lecturer Mitsuru Naito	Biofunctional Materials	3	We aim to create novel nanomedicines based on material engineering. To this end, functional polymers and size-regulated inorganic nanoparticles are precisely designed as components of nanomedicines for "targeted" delivery of biopharmaceuticals to cancer, brain, or specific disease sites. Main research themes: (1) Development of nanomedicines targeting cancer, brain, or muscle. (2) Development of nanobiomaterials for RNA vaccination. (3) Design of novel nanobiomaterials for oligonucleotide therapeutics. (4) Design of novel biocompatible, functional polymeric materials.
School of Engineering			

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Name	Research Field	Capacity of Master's Students[1]	Detail and Research Topics
Affiliation			
Associate Professor Shunsuke Yagi	Energy Storage Materials Engineering	3	It is necessary to establish processes to efficiently utilize limited energy resources in addition to technological innovation in the fields of energy storage and electricity generation by renewable energies such as solar and wind power for the achievement of the sustainable society. In our laboratory, we investigate energy storage/conversion materials and synthesis processes of functional materials by electrochemical methods for the development of highly-efficient utilization technology of electrical energy. Main research subjects (1) Materials for next-generation rechargeable batteries using multivalent ions as carrier ions (2) Mechanism of electrocatalytic activity and its application to energy conversion (3) Catalysts for electrochemical reduction of carbon dioxide (4) Anticorrosion technologies using electrochemical operations
Institute of Industrial Science			
Professor Hidehiro Yoshida Lecturer Hiroshi Masuda	Structural Ceramics	4	The mechanical properties of structural ceramics are governed by the atomic configuration and chemical composition in the local region such as grain boundaries and interfaces. In addition, our recent research has revealed that the mechanical properties in ceramics are significantly influenced by externally applied fields such as electro-magnetic field. Our laboratory aims to find out unique mechanical responses in structural ceramics by means of controlling grain boundary structures and to develop new structural ceramics based on understanding of deformation / fracture mechanisms and atomic interaction. Recent research topics are as follows. (1) High temperature plastic flow and failure of grain boundary-controlled ceramics (2) Superplastic flow of ceramics under applied strong electric fields (3) Mechanical response and mass transport phenomena of ceramics under strong electric fields (4) Improvement of mechanical properties of ceramics using unique anisotropic texture (5) Study on plasticity forward toughening of ceramics
School of Engineering			

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Name	Research Field	Capacity of Master's Students[1]	Detail and Research Topics
Affiliation			
Professor Ryo Yoshida	Biomaterials System Engineering	2	We attempt to design and construct synthetic polymeric gel systems mimicking several functions expressed in living systems. Living organisms can be regarded as the ultimate material system in which information transmission, material transport, motion and force generation occur through cooperation at the molecular level. In particular, "cell is gel", and both are very similar in their physicochemical properties. Among the various properties exhibited by gels, there is a common and universal mechanism approaching the essence of life. By extracting its essence and skillfully designing its molecules, we will artificially create biomimetic gels that approach life functions such as movement, mass transport, and information conversion/transmission, aiming to apply them to new biomaterial systems. In particular, polymer gels exhibiting self-beating autonomously like heart muscle (self-oscillating gels), polymer brushes causing autonomous ciliary motion (artificial cilia), soft actuator with peristaltic motion (artificial intestine), polymer vesicles undergoing spontaneous oscillation with structural changes (artificial cells), polymer solution repeating autonomous sol-gel transition (artificial amoeba), etc., are fabricated.
School of Engineering			
Professor Satoshi Watanabe	Computational Materials Science	2	Aiming to derive guiding principles of design of novel materials and their synthesis processes, simulations to predict materials properties and development of methods for them are being conducted. Recent major topics are as follows. (1) Simulations of electronic states, phonon states and related properties of nanostructures to explore novel information and energy devices (2) Simulations of elementary reaction processes and ion transport properties in nanostructures for resistive switching devices, all solid-state battery, etc. (3) Development of machine-learning interatomic potentials to perform the above (1) and (2) with high efficiency and reliability (4) Analyses of materials properties and design of materials by combining atomic/electronic level calculations and informatics/statistics methods (5) Development of novel computational methods and codes to tackle with problems for which no relevant methods and/or codes are available
School of Engineering			

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Name	Research Field	Capacity of Master's Students[1]	Detail and Research Topics
Affiliation			
Project Professor Takeo Hoshino	Sustainable Basic Materials Management Engineering (Environment Management Engineering Course)	2	Research is being conducted on methods such as the construction of mathematical models to quantitatively analyze how much impact basic metal materials such as steel, aluminum, and copper have on the environment through their life cycles assessment (from production to disposal, or recycling), and LCA analysis that takes into account the recycling of materials. We are also conducting material flow analysis of alloying elements in metals. The main research topics are as follows (1) Construction of LCA analysis method considering recycling of sustainable base materials (2) Analysis of material flow of each alloy in consideration of additive elements in metal materials, and prediction of future concentration of impurity elements mixed in by recycling (3) Predicting the future sustainability (criticality: stability of supply) of base materials In advancing these themes, it is necessary to combine knowledge of materials engineering, material flow analysis, theories such as probability and statistics, and thermodynamics. We will propose the results of our research to the government and industry, and set future directions for the use of basic materials to realize the sustainable use of metallic materials and the establishment of a framework for a resource-recycling society.
School of Engineering			

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