

# JSPS SUMMER PROGRAM '18

*PhD. Anna Martin Vilardell*

*2019/04/26*







# ABOUT ME

[2013-2017] PhD. Materials Science (Barcelona, Spain)

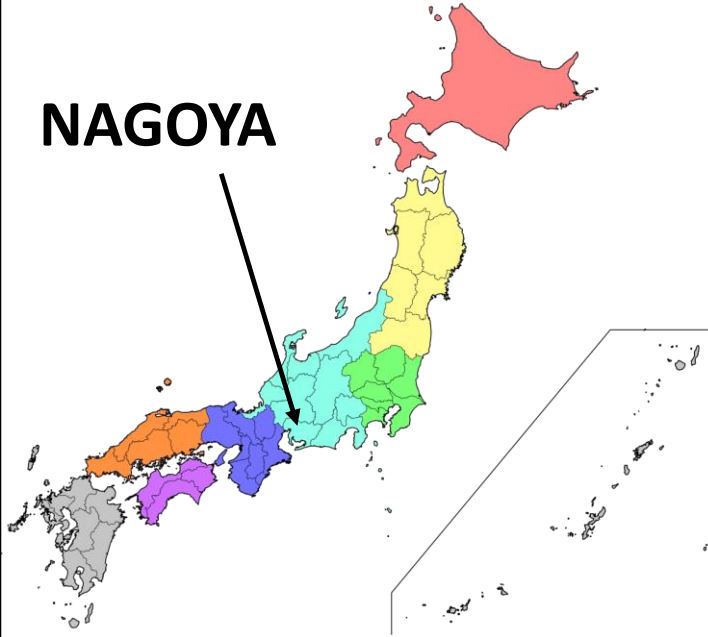
[2017-2019] Post-doctoral researcher (Karsltad, Sweden)

Goals:

- To develop my own project.
- Enhance knowledge, gain experience.
- Social networking

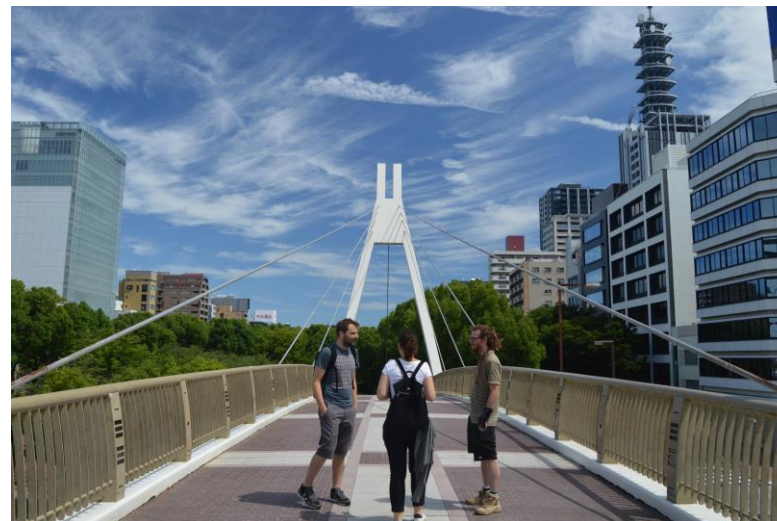


NAGOYA



## ABOUT NAGOYA

- Nagoya (名古屋) is the largest city in the Chubu region of Japan.
- 4 largest city in Japan.
- 3 most populous urban area.
- Very centric, but not as not as expensive as Tokyo and Kyoto.
- Industrial area (e.g Toyota company,...).





# 0 Sum up of JSPS Summer Program

**PRE-DEPARTURE**

*Tips before trip starts*

**SOKENDAI**  
*(Less than a week)*

*Overview of Sokendai stay*

**HOST FAMILIES' WEEKEND**  
*(Weekend)*

*Japanese experience*

**RESEARCH AT HOST  
INSTITUTIONS**

*Research collaboration*

**FAREWELL PARTY**

*General overview*

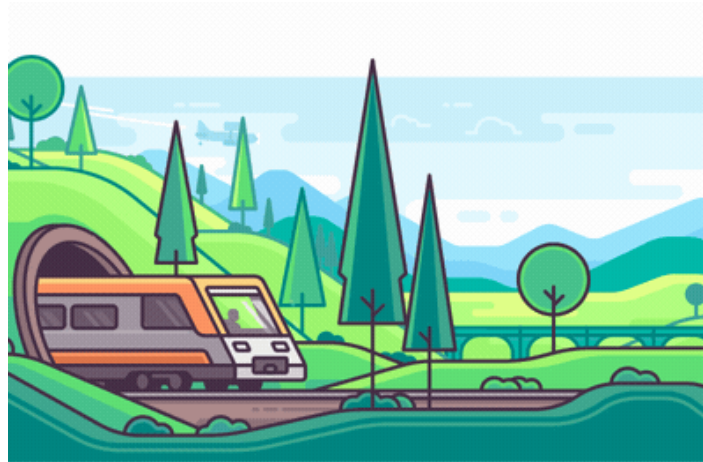


*Nara, Japan*

# 1 Tips Pre-departure

## ON-LINE ARRANGEMENTS

- Arrange your accommodation! – Help from the host.  
*(\*Tokio and Kyoto can be expensive).*
- Arrange your flights! – Help from JSPS.  
*(Ask permission if you want to stay longer. Up to 90 days).*
- Arrange your transport! – Help from JSPS *(From Sokendai to Host university).*
- Answer the JSPS questionnaire carefully *(For Homestay family).*



Miyajima, Japan



# 1 Tips Pre-departure

## THINGS TO HAVE IN MIND

- Recommended: 2 luggage (*1 Sokendai + 1 sent to Host university*).  
*I brought a carry on luggage inside the big luggage for domestic flights.*
- Pocket WiFi / International SIM card.  
*Pocket WiFi – Previously ordered online / SIM - Get in the airport.*
- JR pass: 1, 2 and 3 weeks.  
*Can be good depending on your schedule/location.*
- Swimsuit in SOKENDAI.
- Gift for the host family and host researchers.
- Cash saves your life!  
*I recommended a min of 500€.*
- Summer is very warm!

*Summer 2018...up to 40 degrees!*



*Golden Temple, Kyoto*

## 2 Introduction week in Sokendai

### SCIENTIFIC EXCHANGE

- Poster session
- Group discussions
- Research talks

### CULTURAL EXCHANGE

- Japanese classes
- Day trip (Kamakura)
- Cultural activities (Tea ceremony, origami, kimono/yukata dressing, calligraphy,...)

### JSPS NETWORKING

- JSPS US + Canada
- JSPS Germany
- JSPS France
- JSPS United Kingdom



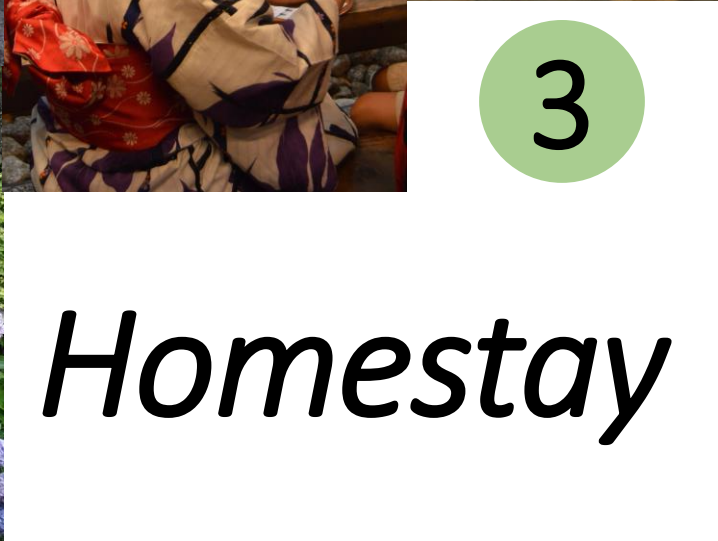
*JSPS Sweden 2018*



## 2 Introduction week in Sokendai









# 4 Research collaboration in Japan

*Department of Material Process and Engineering  
Graduate School of Engineering, Nagoya University*





# 4 Research collaboration in Japan

## PROJECT GOAL:

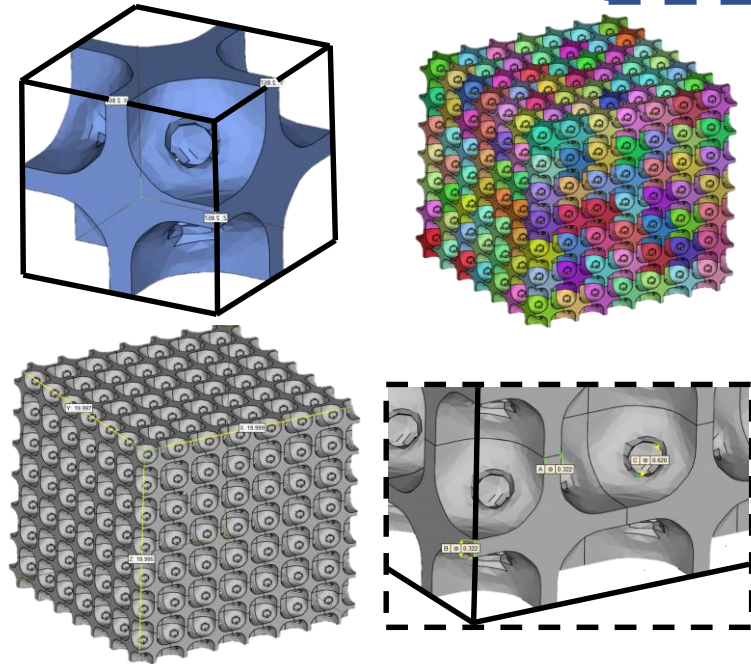
- The obtaining high porous and stiffness cellular lattice structures for implant applications by 3D printing

## PROJECT STEPS

1. Topology optimization of lattice structures
2. Manufacturing of specimens
3. Microstructural and mechanical characterization of the specimens



## 1. TOPOLOGY OPTIMIZATION



## THREE LATTICE UNIT DESIGNS

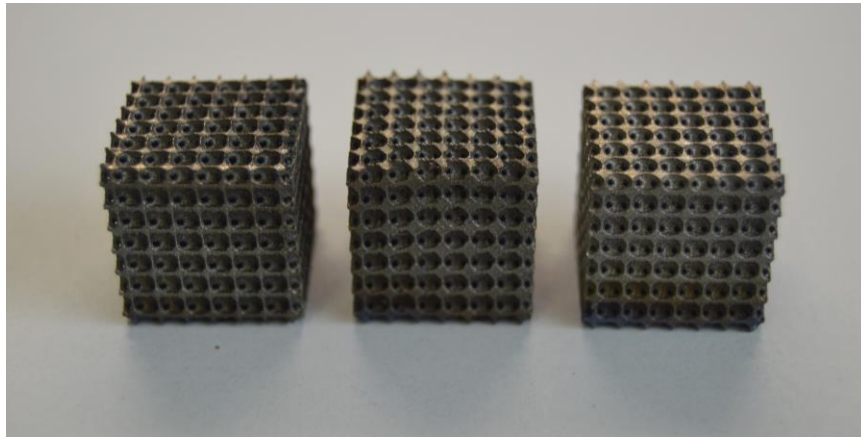
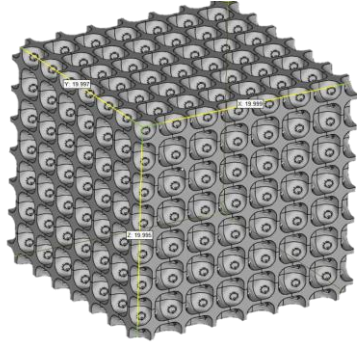
- **Porosity (%):** 55%, 60%, and 65%
- **Elastic modulus:** 18.6, 23.1, 27.4 GPa



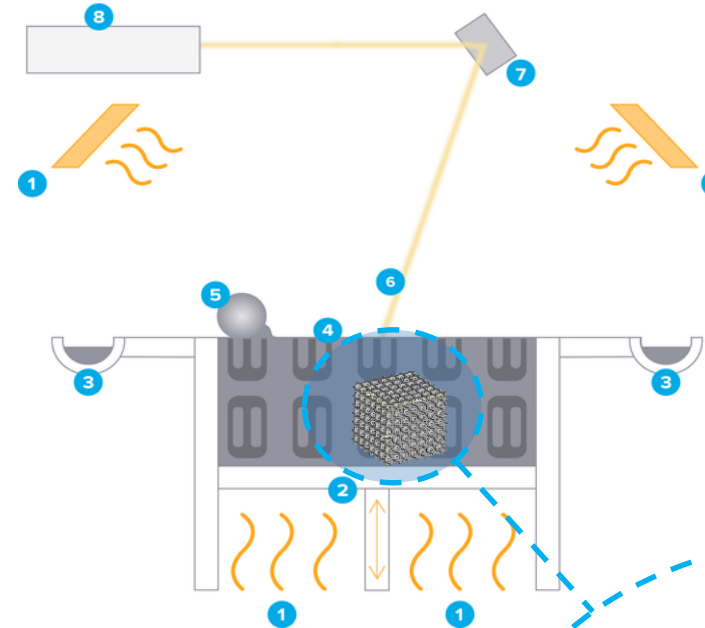
# 4

## Research collaboration in Japan

### 2. 3D PRINTING OF THE SPECIMENS



### 3D PRINTING PROCESS

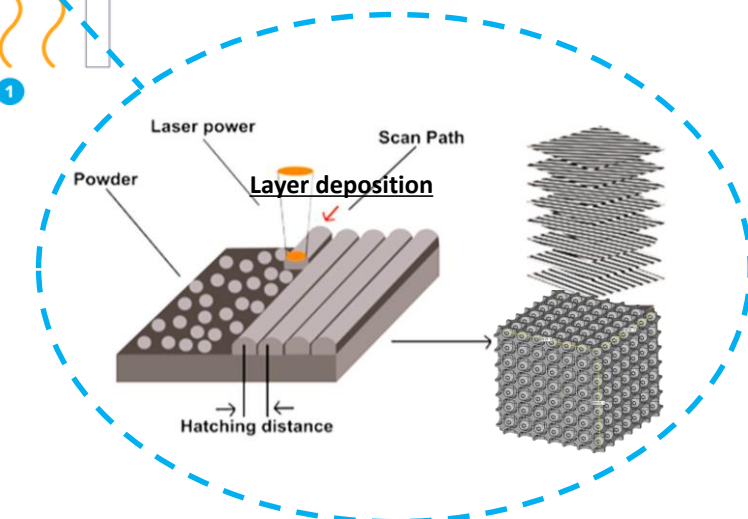


### Selective Laser Sintering

- 1 Heaters
- 2 Build Chamber
- 3 Powder Delivery System
- 4 Printed part
- 5 Recoater
- 6 Laser Beam
- 7 X-Y Scanning Mirror
- 8 Laser

### AM benefits:

- Lower elastic modulus
- Higher porosity





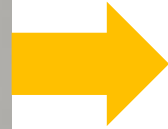
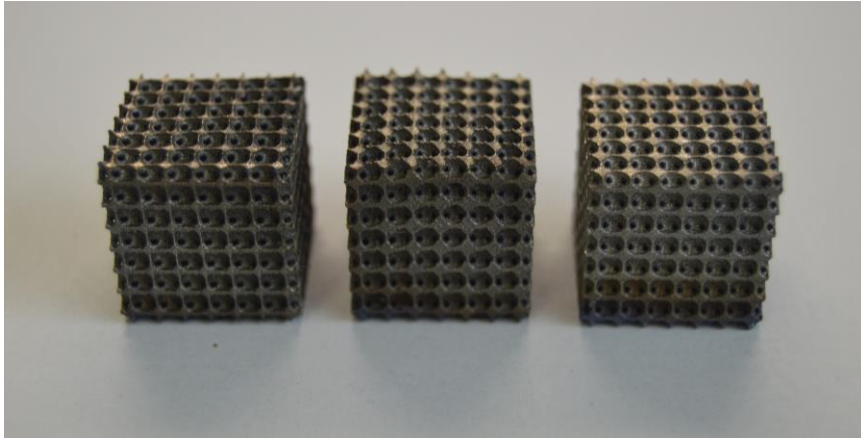
## 4

## Research collaboration in Japan

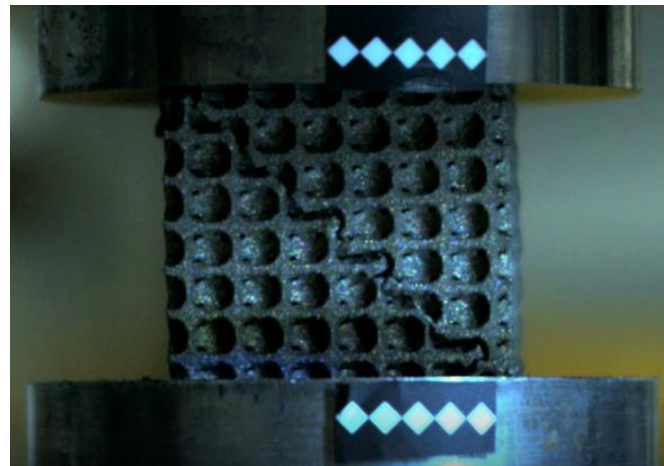
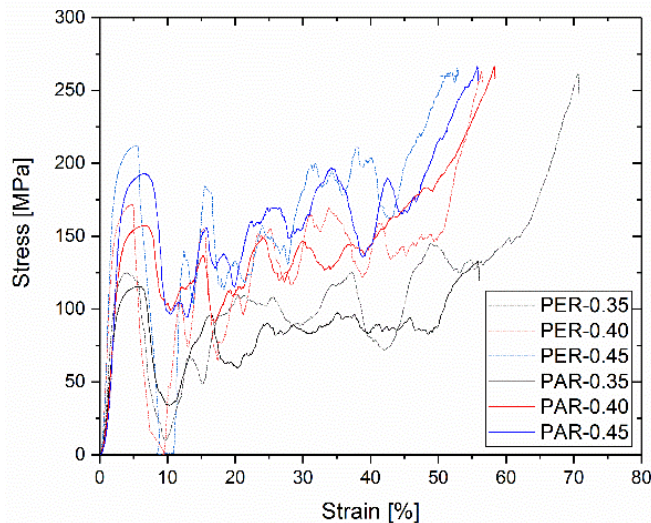
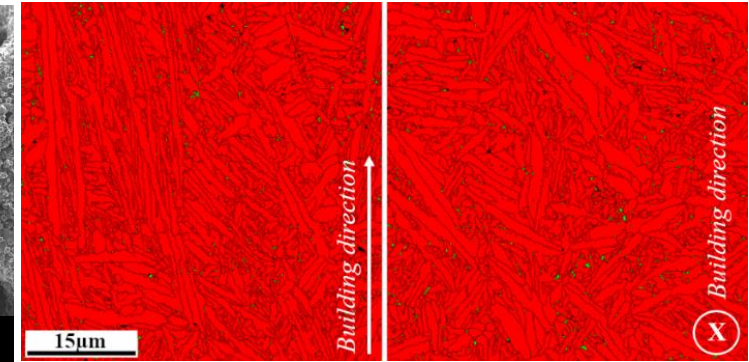
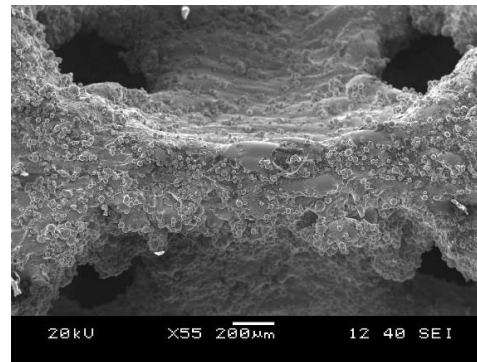


名古屋大学  
NAGOYA UNIVERSITY

### 3. MICROSTRUCTURAL AND MECHANICAL CHARACTERIZATION



Lattice designs	Designed porosity	Conv. measured porosity	MicroCT measured porosity
CLS 0.35	65.8	72.7±0.2	71.5±0.006
CLS 0.40	61.0	68.7±0.3	67.6±0.006
CLS 0.45	56.2	64±0.4	62.7±0.003



*Collaboration is still ongoing:*

- *We are working with two articles.*
- *Participation in conference + Visit Japanese researcher to Karlstad University*

*\*JSPS Postdoctoral fellowship*



## 5 General advices

- Rules are important, and there are guidelines for almost anything.
- Onsen is fantastic.
- People are very kind and will help you out, so don't be afraid to ask.
- Japan is safe, just be mindful of the weather.
- Be kind and respectful
- Enjoy as much as you can!





# 6 Enjoy: Food, culture, traditions...







OKINAWA



FURANO



SAPPORO



OSAKA



MIYAJIMA



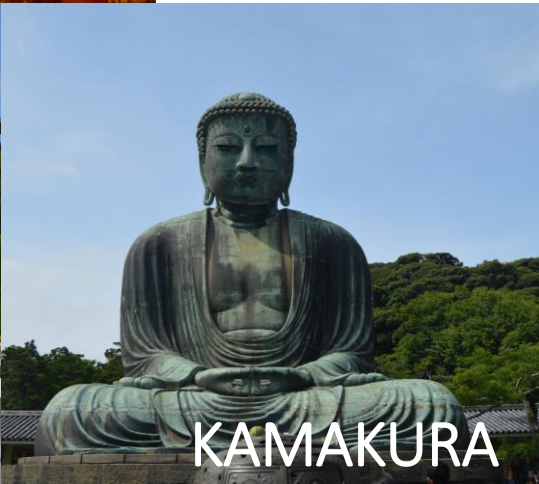
TOKYO



KYOTO



HIROSHIMA



KAMAKURA



NARA



NAGOYA



ZAMAMI ISLAND