UNIVERSITY
OF TRENTO - Italy

How to give a good research/technical talk

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Motivations

- For your work to have significant impact, it is essential that you can convey results to your community
- Your technical/scientific reputation depends on colleagues' reaction to your talk
- Remember, when on the job market, this skill will be crucial in getting a better research/technical position in academics or industry
- Giving a good talk is a skill you can learn
- This is a brief guidance for giving a good talk

Outline

- Goals of a Talk
- Planning Stages
- Structuring Your Talk
- Slides Preparation
  - ✓ *The Do's*
  - ✓ *The Don'ts*
- At the Talk
  - ✓ *The Do's*
  - ✓ *The Don'ts*
- Concluding Remarks

Goals of a Talk

- Meta-Goal:
  - *keep audience's interest (and attention)*
  - *convey technical material*
  - *communicate a key idea of work*
  - *provide intuition*
  - *convince audience to read your paper*

- Non-Goals:
  - *show people how smart you are*
  - *expect audience to understand most key details of your work*

Planning Stages

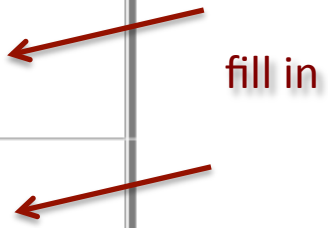
- **Know your audience:**
  – Who is the audience? What is its background?
  ✓ *general / non-specialized audience*
  ✓ *somewhat specialized audience*
  ✓ *highly specialized audience*

- **What information the audience wants to "take away"?**

- **If someone has spoken before you:**
  – look at paper/abstract of relevant talks that proceeded yours
  – prepare to use context provided

Preparation of the talk

QUESTIONS TO ASK YOURSELF	EXAMPLES	MY IDEAS
1. What is the aim?	to buy my product to adopt my recommendations to join the club to give me a job	
2. What is my title?	The new Mokia 2001 How to reduce production costs The INT Chess Club	
3. Who am I speaking to?	What are the benefits to the audience of my product/report/speech? Are these people the decision makers? What do they know of the subject? How does this change my approach? What sort of questions will they ask me? What are the answers? What aspects will they be interested in?	
4. What are the main points I want to make?	1, 2, 3; first, second, third; point a, point b, point c	
5. What do I want the audience to do after listening to my presentation?	We must invite them: to buy my product to accept my findings to join the club to give me a job	



Structuring Your Talk

- The title on the first slide!!
- An agenda (outline) should follow with a list of the main points covered in the presentation
- Use a top-down approach:
  1. *Introduction: define problem, present a "carrot", put in context and give outline (this can be placed just after the title slide)*
  1. *Body: high level summary of key results*
  2. *Technicalities: more depth into a key result*
  3. *Conclusions: review key results, wrap up, present future work*
- Limit what is put on each slide to a maximum of 5-6 bullets or information
- Use styles and formats carefully and orderly (top-down scale)
- Each slide should be on for a minimum of 20 seconds and no more than 2 minutes

The Introduction

- ***This is the most important part of the presentation!***

- Define the problem
  - ✓ *minimize use of terminology*
  - ✓ *use pictures/examples if possible*
- Motivate the audience (give a "carrot")
  - ✓ *why is problem important?*
  - ✓ *how does it fit into larger picture?*
  - ✓ *what are applications?*
- Discuss related work
  - ✓ *table useful (mention authors and dates)*
- Succinctly state contributions of your work

The Body

- Abstract the key results
  - ✓ *focus on a central, exciting concept*
- Explain significance of your work
- Sketch methodology of key ideas
  - ✓ *keep it high-level, emphasizing structure*
  - ✓ *use pictures/diagrams if possible (not tables)*
  - ✓ *provide intuition (helpful when someone later reads your paper)*
  - ✓ *gloss over technical details*

The Technicalities

- Take key results (or part of them) and go into some depth
- Guide audience through difficult ideas
  - ✓ *give overview*
  - ✓ *state result*
  - ✓ *show an example*
  - ✓ *review*
- It is this portion of your talk that typically grows when you give a 45-50 minutes talk

The Conclusion

- Provide a coherent synopsis (*brief survey*)
- Review key contributions and why they are important (relate them to the Introduction)
- Discuss open problems/future work
- Indicate your talk is over (for example, “Thank you. Are there any questions?”)
- Be ready to answer questions
  - ✓ *If there are points you glossed over that you expect the audience may be interested in, you may want to prepare some additional slides (just in case)*

Slides Preparation—Do's

- Decide what you want to say and say less
- Allow an average of 1–2 minutes for each slide
- Use Repetition – "Tell them what you're going to tell them. Tell them. Then tell them what you told them."
- Try to use positive (and not negative) sentences
- Realize that 20% of your audience at any given time is thinking about something else
- Use pictures/diagrams whenever you can (*less bullets!*)
- Create original pictures and diagrams
- Use numbers between 0 and 10 (in diagrams and figures) if possible
- Use rigorous units and format (Int'l Standard)
- If you use a slide more than once, duplicate it

Slides Preparation - Do's *(cont'd)*

- PRACTICE! – give a practice for your colleagues, advisor, friends, pets, etc.
- Make sure it does not take too much time
- Use a large (at least 20 pt) and clear font
- Make neat/orderly slides (computer-generated preferable)
- Use overlays or other "scaffolding"
- Use colour/animation (*in a meaningful way, it is not a "show"*)
- You do not need to use full sentences
- Number your transparencies
- Write reminders, key phrases etc. on paper (*for your personal use!*)
- Check your spelling

Slides Preparation—Don'ts

- Intend to use too many slides
- Put some detail on the slide that you do not want to talk about
- Get bogged down in details
- Use tables or charts from paper (they are usually very detailed and hard to see)
- Show complex equations
- Show codes
- Use pictures from other presentations unless of clear quality
- Modify other pictures/photographs format/shape

Slides Preparation—Don'ts *(cont'd)*

- Have a slide that introduces a point that you are unsure of (*unless you want to give the audience a chance to attack you!*)
- Present last minute results (*they may be probably wrong*)
- Have slides that you are not using mixed in with the rest
- Write messy, write too small, misspell words

At the Talk—Do's

- Dress appropriately—this shows respect for your audience
- Have eccentricity (but not too extreme) - make it fun/easy for people to remember you – extreme eccentricity is bad for younger people
- Be excited about your work!
- Remind; don't assume
  - ✓ *If you assume a standard result, provide the audience with a brief reminder*
- Talk with sufficient volume
- Make eye contact and "read" the audience – change victims
- Be with the audience
  - ✓ *Walk toward and away from the people as well as left and right to break down implicit barrier*

At the Talk—Do's *(cont'd)*

- Point to the screen, not transparency/computer monitor
  - ✓ *Use a pointer, not hand/fingers/pen*
- Bring props or laser pen
- Ask real and rhetorical questions to keep audience engaged
- Deflect obstructionists:
  - ✓ *tell them you would like to talk to them after the talk (about the interesting point made) because the point is a detail, tangential, has a long answer, you need to think about it etc.*
- Finish on time!

At the Talk—Don’ts

- Talk too softly, mumble or speak in a monotone voice, use “um”, “ah”, …
- Rush the presentation by speaking too fast
- Read your slides
- Flash slides one after another
- Focus attention on the screen—you’ll end up talking to the screen *vs.* the audience
- Stand so that you block the projection
- Mention a detail/point you don’t want to talk about
- Babble on when you have nothing to say
- Run over time

Concluding Remarks

- Follow the guidelines provided here
- Take every opportunity you can to give talks (and thus get practice and feedback) - practice for colleagues, etc. to get feedback
- Remember that the guidelines for structuring your talk must be adapted to each specific talk
- Preparing a good talk takes time; do not expect to throw it together last minute

An example

Laboratory activity presentation, 1st version

UNIVERSITY
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MASTER OF SCIENCE IN MATERIALS SCIENCE AND ENGINEERING

LABORATORY ACTIVITY– TAPE CASTING AND SINTERING OF ALUMINA

Format?
Useless infos

xxxxxxxx

Matricola: yyyyyyy

2011/12

Objective and work program

- ✓**Optimization of sintering condition**
  - ➢Preparation of Alumina suspension
  - ➢Production of tapes (300 µm and 600 µm)
  - ➢Dilatometery analysis
  - ➢Sintering at different temperatures
  - ➢Density measurement
  - ➢Mechanical strength measurement
  - ➢Microstructure analysis
  - ➢Data analysis and comparison

Aim?
Outline?

Suspension Preparation

	Weight(g)
Water	23.96
Defflocculant	1.23
Alumina powder	100.09
TOTAL	125.22

Mixture → **Ball Mill** (Over night) → **Filtration** → **Deaeration Under vacuum** → **Suspension (= 94.20g)**

➢ **31.02g** of the suspension has lost during filtration and deaeration on the surfaces of the flasks and bottles

? **Absolute data?**
Wrong definitions and terms
Useless infos

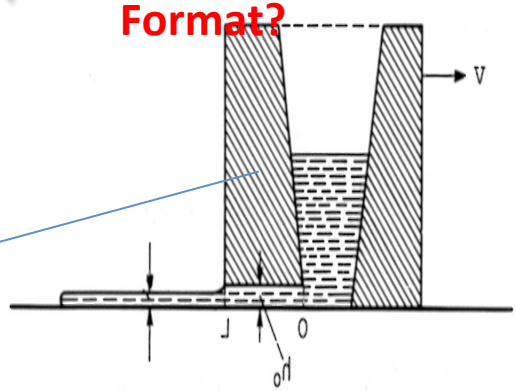
Production of tapes

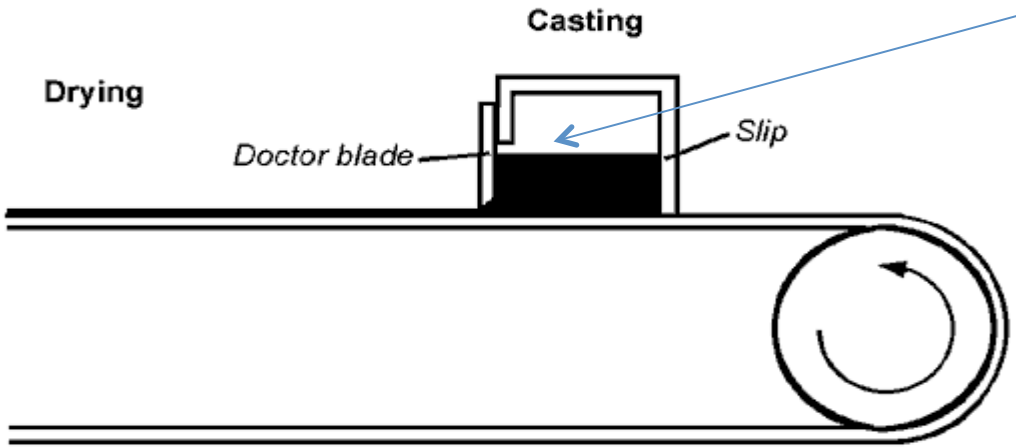
Suspension	94.20g
Binder (Duramax B1014)	7.07g
Plasticizer (Duramax B1000)	3.28g

Mixer
(150 rpm, 30 min)

Absolute data?
Wrong definitions
Useless infos
Missing data
Format?

- ✓Setting the tape casting machine
- ✓Double doctor blade
  1) to spread the paste over the substrate
  2) to determine the actual nature of the tape



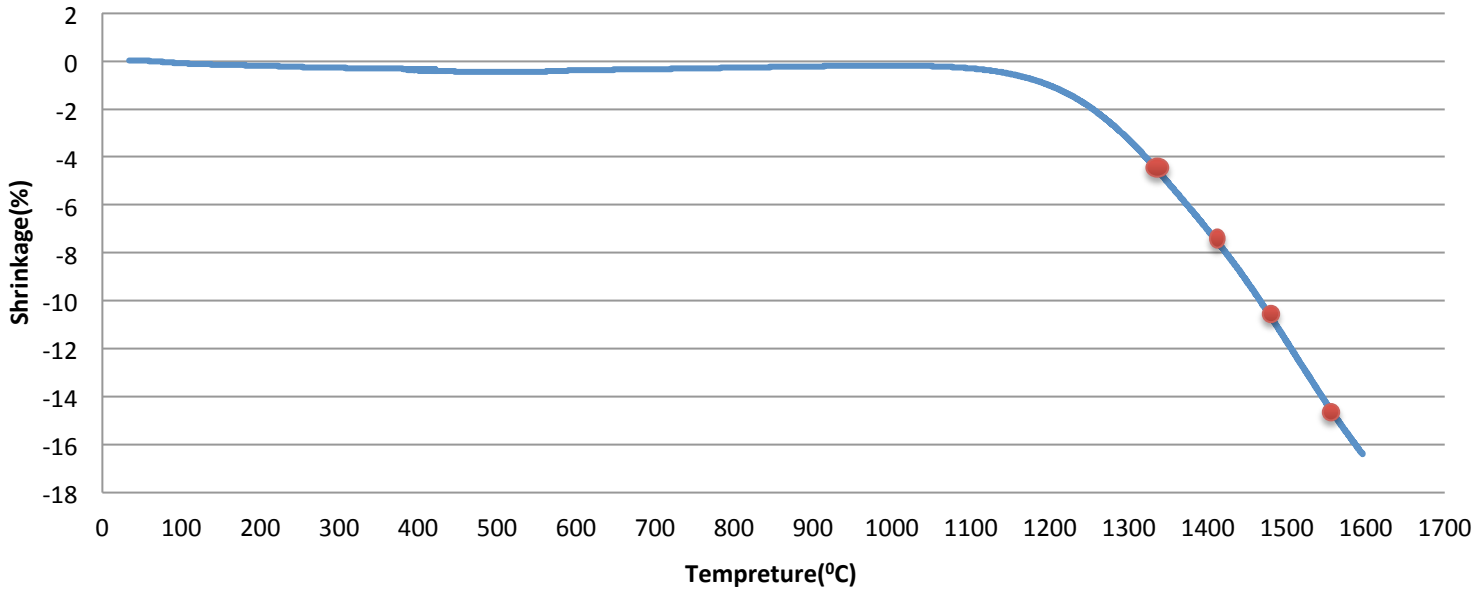


- ➢300 µm
- ➢600 µm

Dilatometry Analysis

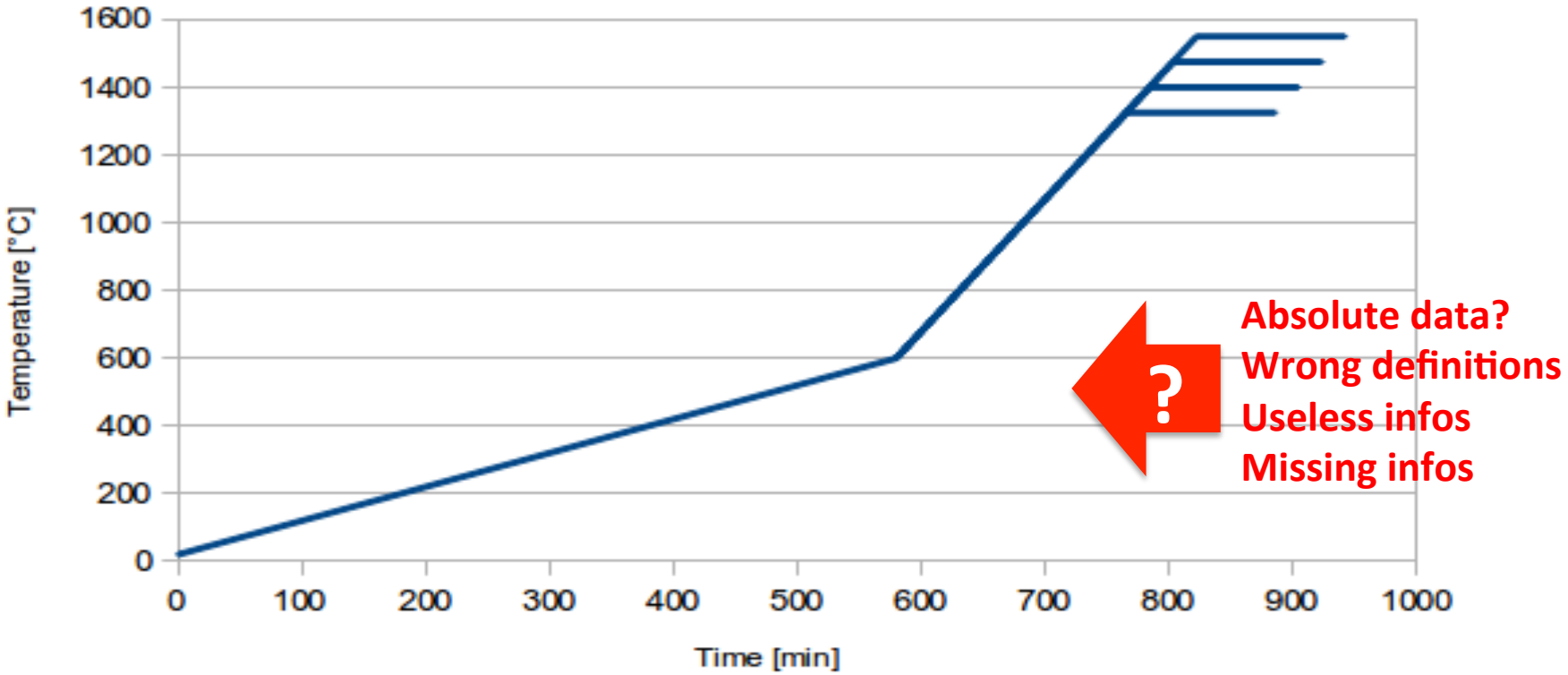
- To determine sintering temperature
  Conditions and parameters
- ✓Pressure…….atmospheric
- ✓Temperature rate….10K/min
- ✓Duration…….600 min
- ✓End temperature….1595^{0}C
- ✓Pressing force…….250mN
- ✓Sampling time……..every 1 second

Useless infos
Unclear diagram



Sintering

✓20 pieces (300 µm and 600 µm), with a diameter 30mm have prepared.
✓Thickness at four different corners and its center were measured.
✓Weight of the samples have taken
✓Furnace (with two different heating rate and at four different sintering temperatures) $1^0C/min$ up to 600^0C and $4^0C/min$ after 600^0C
$1550^0C, 1475^0C, 1400^0C, 1325^0C$



Density Measurement

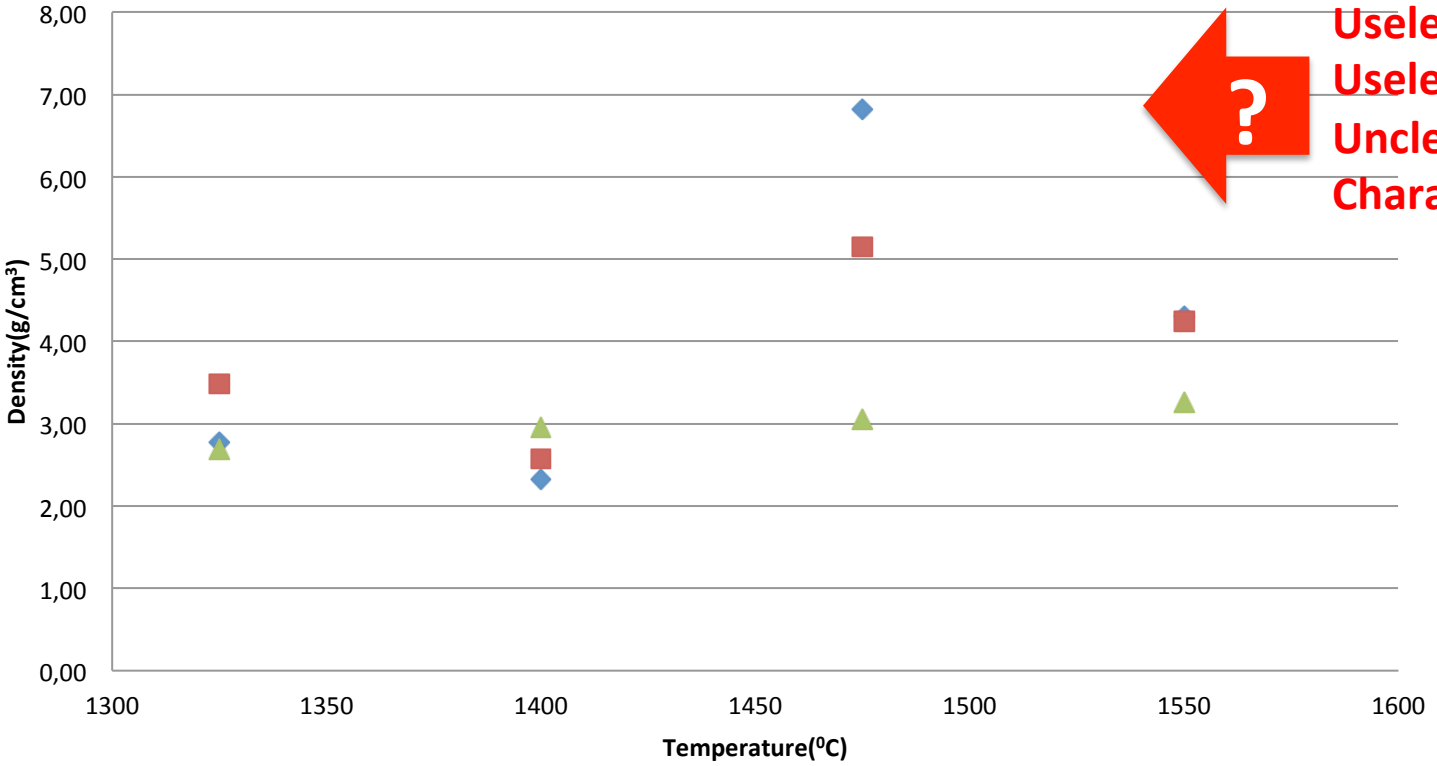
- To select the best sintering temperature that gives dense(optimal) product.

Green Density = 2.33g/cm^3

$\rho_a = m_d/(m_d-m_s)*\rho_w$

$\rho_b = m_d/(m_w-m_s)*\rho_w$

300 µm



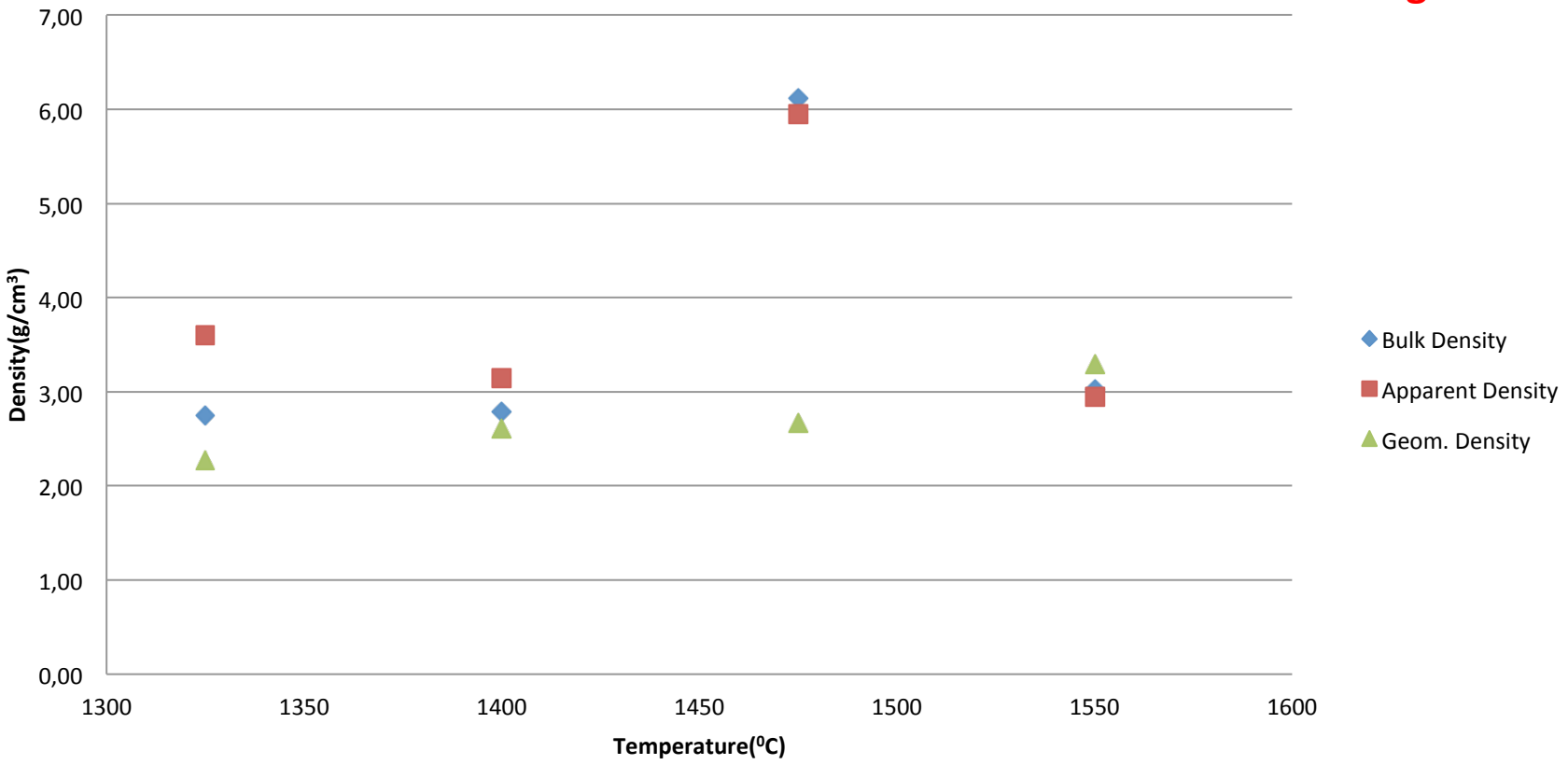
?

Useless aim
Useless infos
Unclear diagram
Character and format?

Density Measurement

Green Density = 2.29g/cm³

Useless aim
Useless infos
Unclear diagram
Wrong data

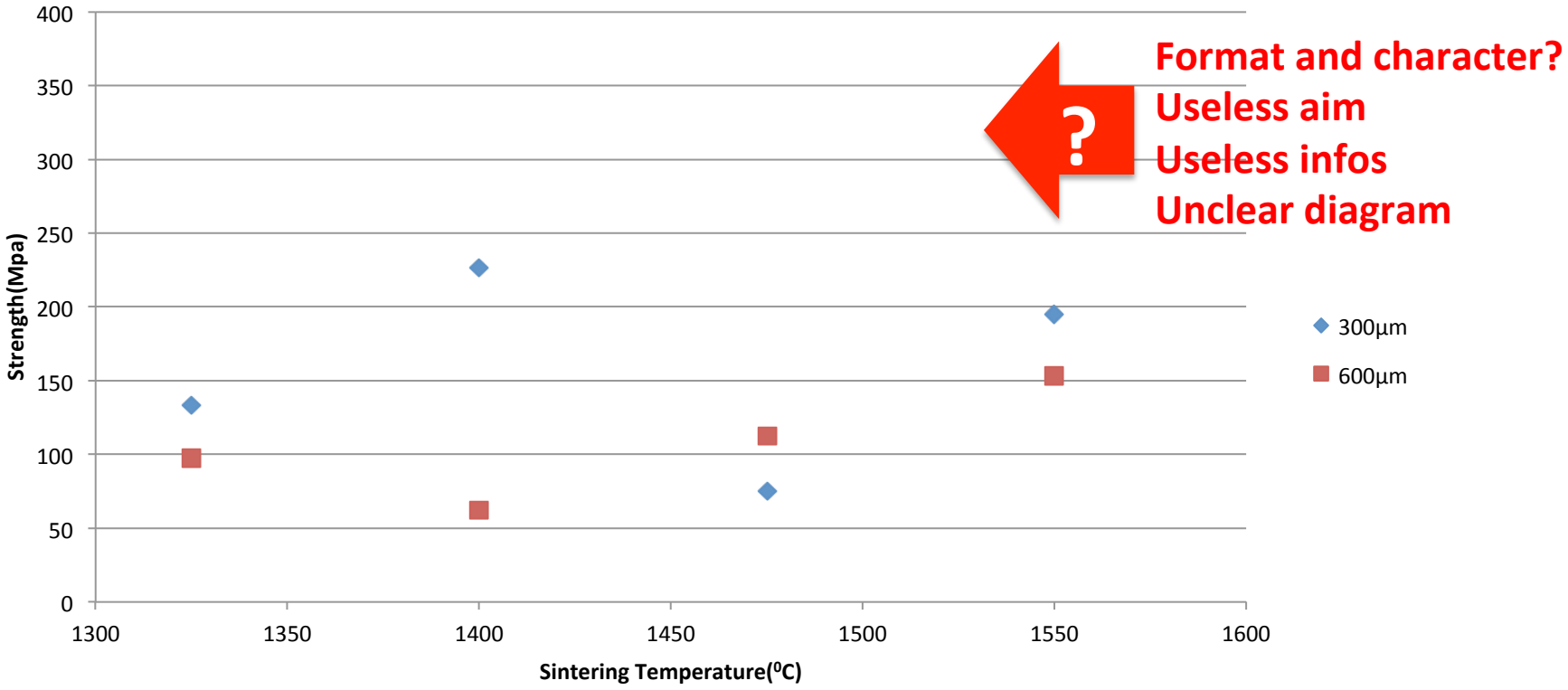


Mechanical Test

Equibiaxial flexural Strength (Ring-on-Ring test)

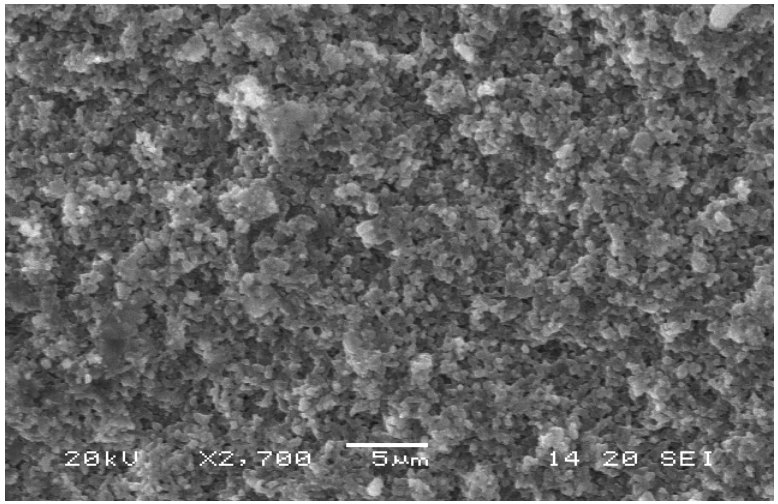
$$\sigma_f = \frac{3F}{2\pi h^2}\left[(1-v)\frac{D_S^2 - D_L^2}{2D^2} + (1+v)\ln\frac{D_S}{D_L}\right]$$

- ✓To investigate the effect of sintering temperature on strength of Alumina
- ✓Comparing strength of tape cast Alumina sintered at different temperatures

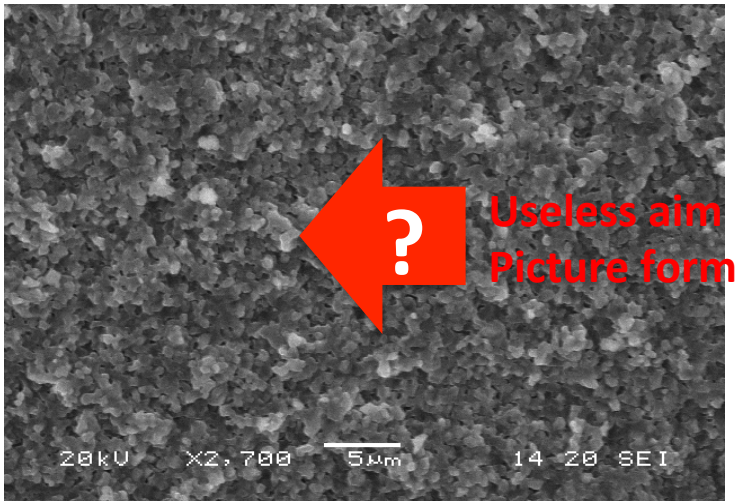


Microstructure Analysis

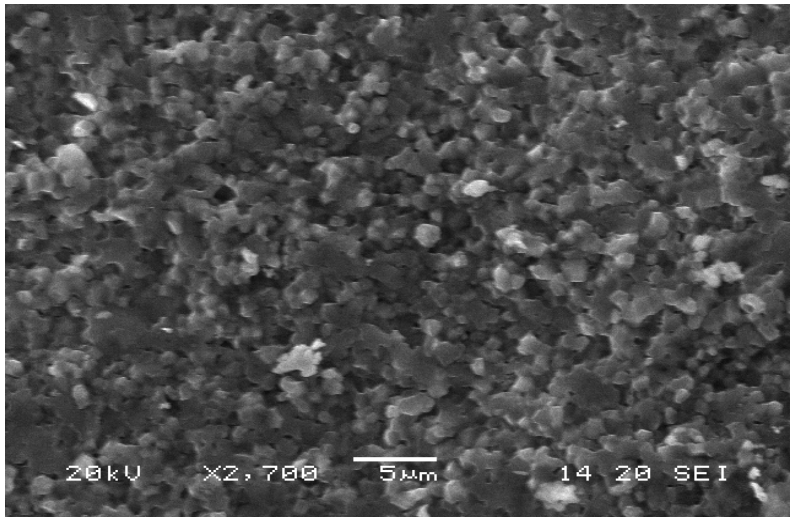
-To analyze the nominal acceptable grain size



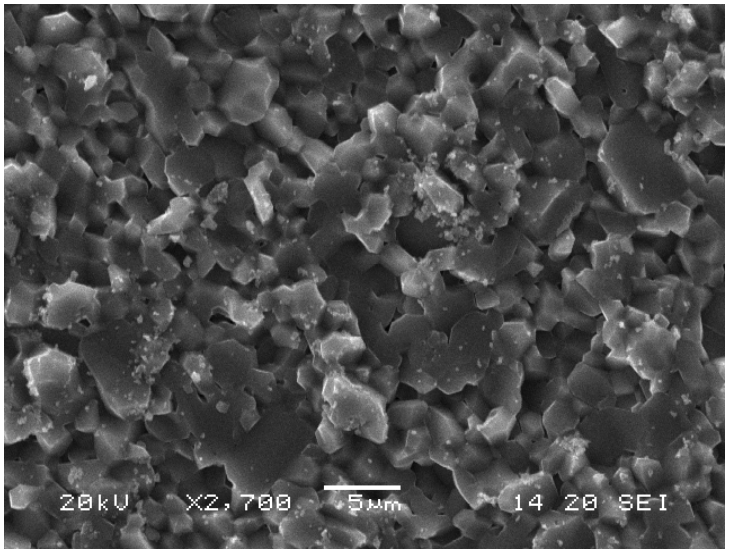
1325^{0}C



1400^{0}C

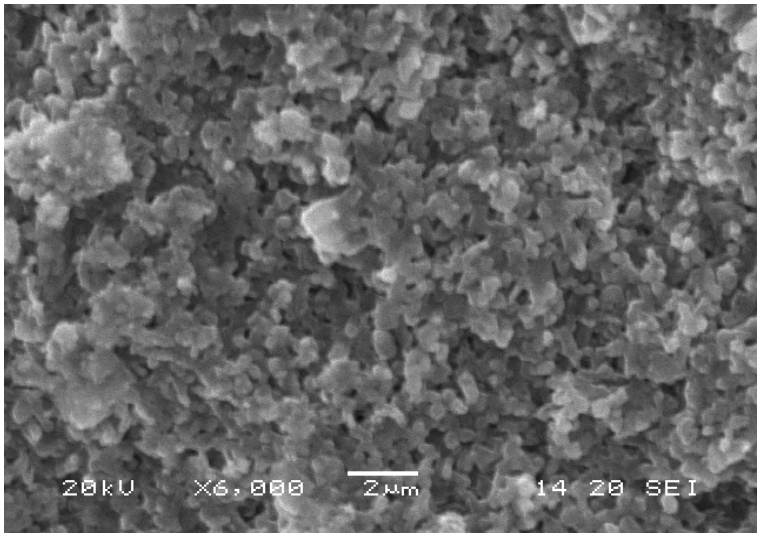


1475^{0}C

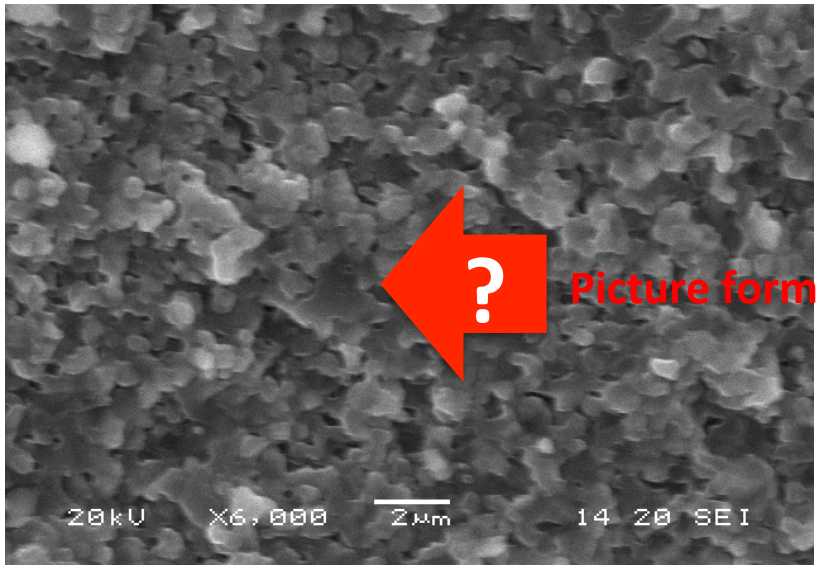


1550^{0}C

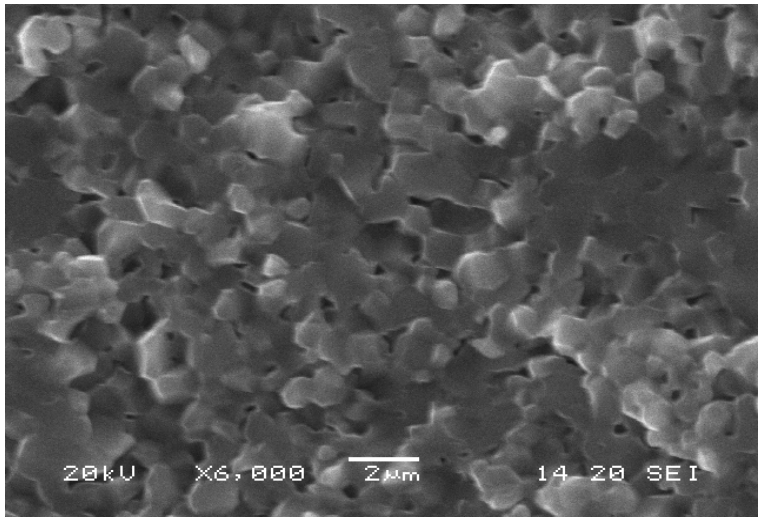
Microstructure Analysis



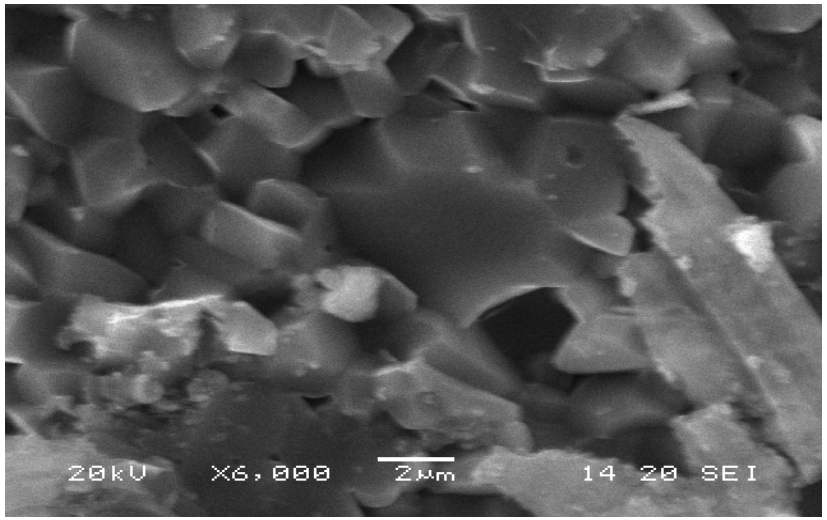
1325^{0}C



1400^{0}C



1475^{0}C



1550^{0}C

Remarks and Conclusion

- Theoretical density……3.69 - 4.00 g/cm^3
- Theoretical flexural strength….330 - 380MPa
- Maximum use temperature……1700^{0}C

Wrong title
Useless data
No conclusions!
Wrong terms

The experimentally obtained values of density and flexural strength are lower than the expected theoretical values.

Large number of experimental samples are required to compromise measurement and experimental errors.

According to our experiment, the best sintering condition that gave relatively highest density, highest strength and nominal grain size is 1550^{0}C.

References

1. ASTM – *C830 Standard Test Methods for Apparent Porosity, Liquid Absorption, Apparent Specific Gravity, and Bulk Density of Refractory Shapes by Vacuum Pressure- ASTM (2009)*

2. ASTM – *C1449 Standard Test Method for Monotonic Equibiaxial Flexural Strength of Advanced Ceramics at Ambient Temperature – ASTM (2009)*

3. *Proffesor Vincenzo M. Sglavo's teaching notes and Lectures* http://www.sglavo.it/teaching.html

4. *Alumina Material Characteristics* http://accuratus.com/alumox.html

Useless infos

THANK YOU!!!!

An example (2)

Laboratory activity presentation, revised version

UNIVERSITY
OF TRENTO - Italy

MASTER OF SCIENCE IN MATERIALS SCIENCE AND ENGINEERING

LABORATORY ACTIVITY REPORT

TAPE CASTING AND SINTERING OF ALUMINA

Zzzzzzzz Mmmmmmmmm

December 20, 2011

Aim of the work

Optimization of sintering conditions (temperature) for tape cast alumina

Outline

- **Experimental procedure**
  Tape casting
  Sintering
  Tests and analyses

- **Results**

- **Conclusions**

Experimental procedure

Suspension preparation

	Weight (g)
Water	23.96
Deflocculant (Darvan C®)	1.23
Alumina powder	100.09
TOTAL	125.22

much better in vol% or wt%!

High energy mixing (≈ 8 h) → **Filtration** → **Deaeration under vacuum** → **Suspension**

some details on the powder, deflocculant and binders would be useful

Experimental procedure (2)

Addition of binder and plasticizer

much better in vol% or wt%!

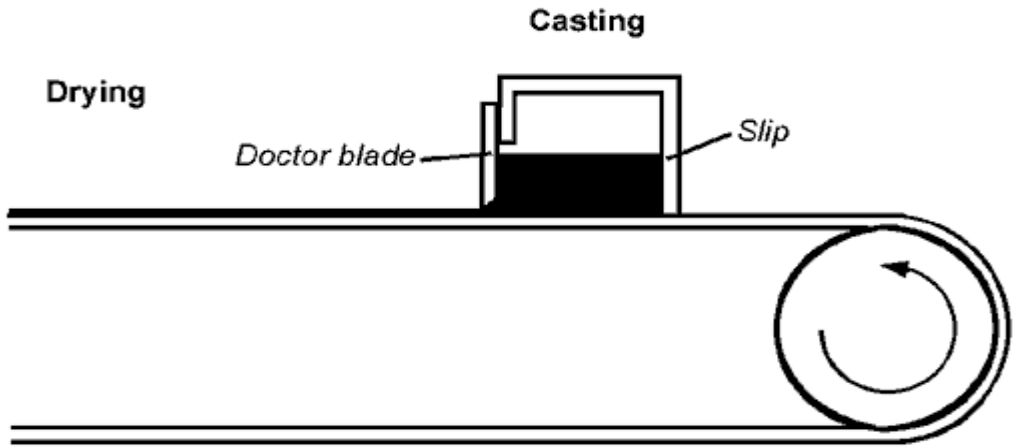
Suspension	94.20g
Binder (Duramax B1014)	7.07g
Plasticizer (Duramax B1000)	3.28g

Mixing for 30 min

Experimental procedure (3)

Production of tapes

By double doctor blade apparatus



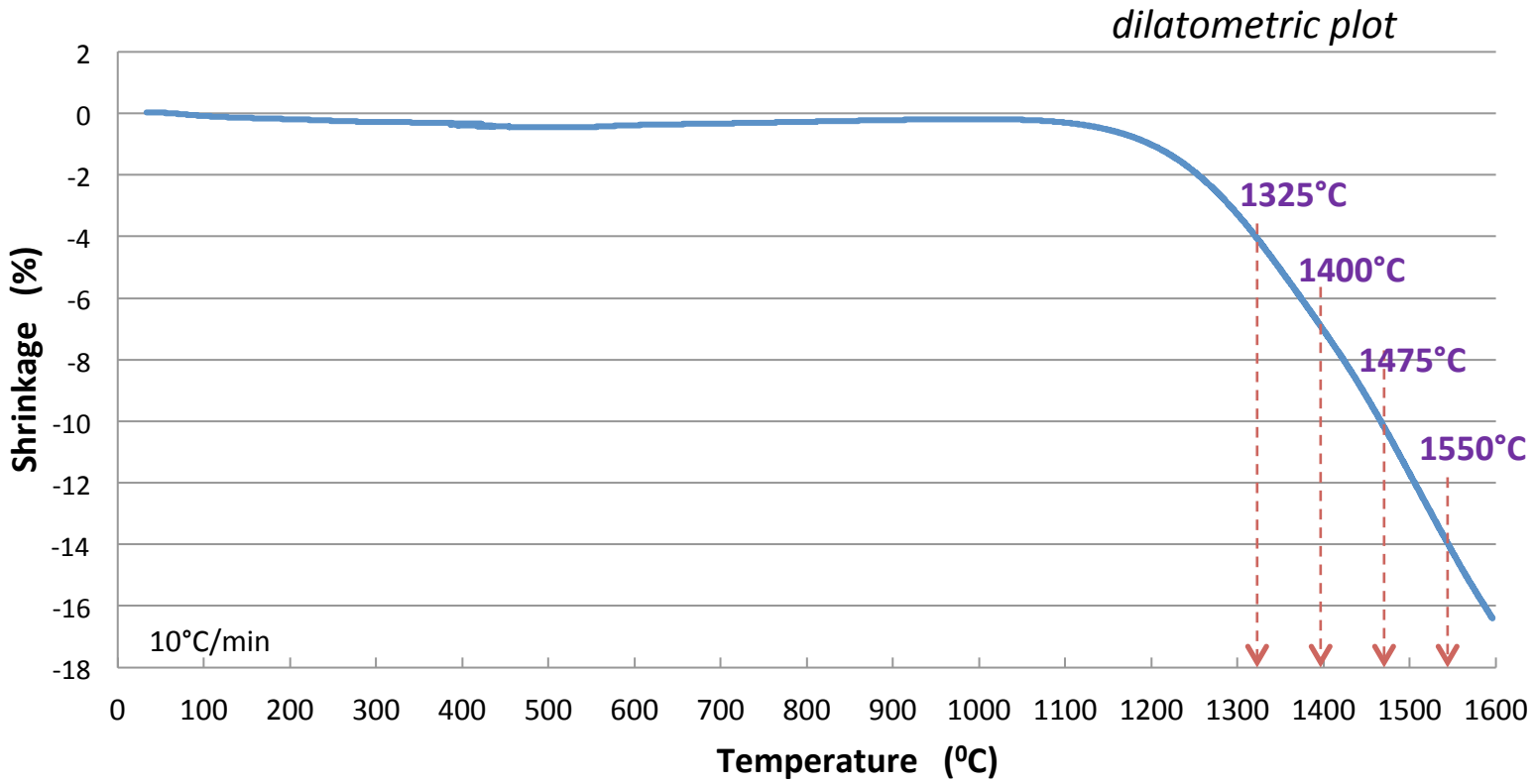
Nominal thickness:

- 300 μm
- 600 μm

Disks (diameter = 30 mm) were punched from the green tape

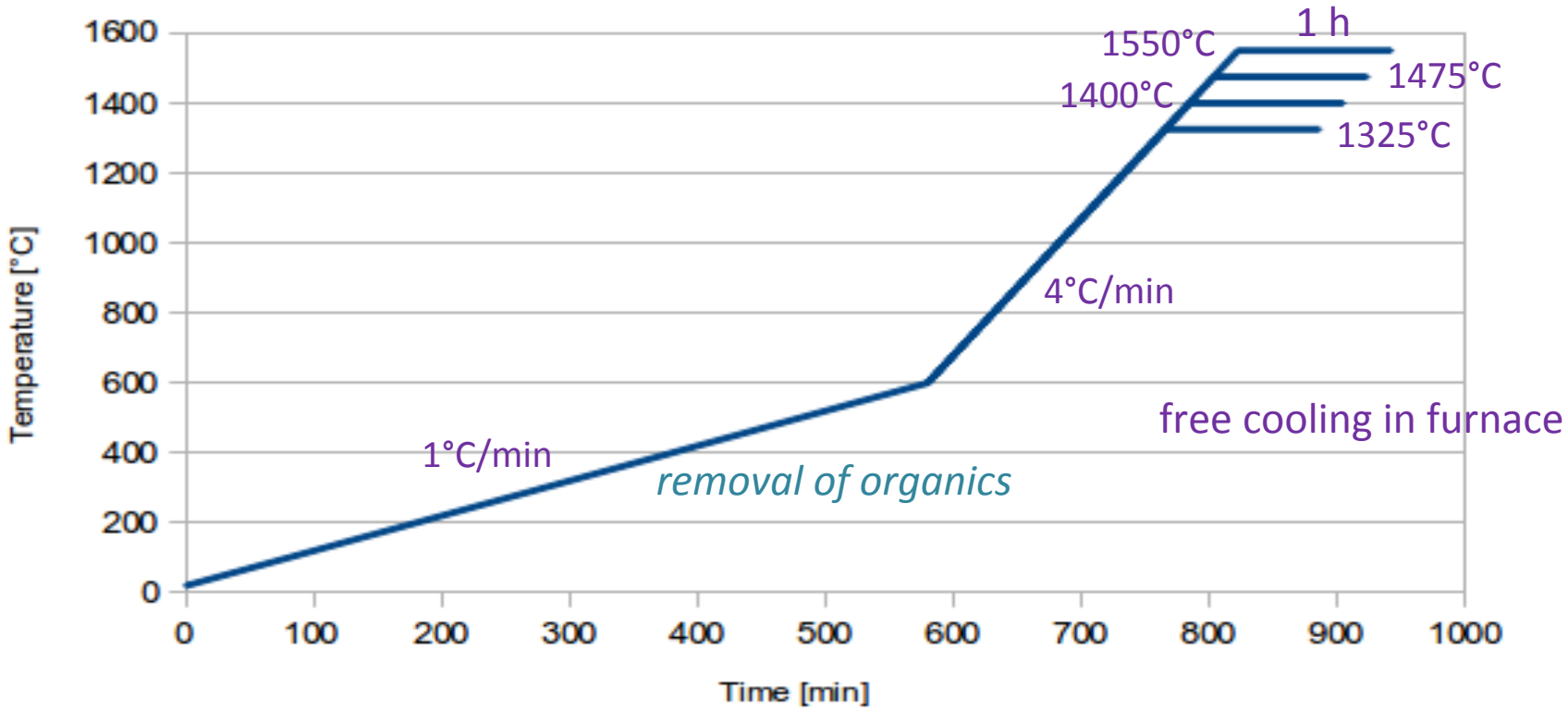
Experimental procedure (4)

Sintering temperatures



Experimental procedure (5)

Heating schedule



Experimental procedure (6)

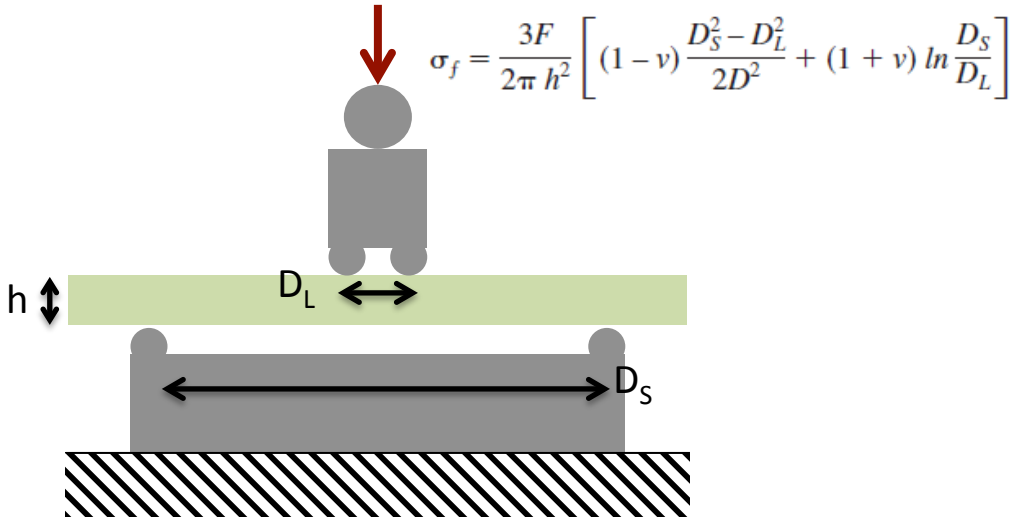
Performed measurements and analyses

- **Bulk (P/V) & apparent (Archimede's method) density**

- **Biaxial flexural test – ring-on-ring (ASTM C1499)**

- **SEM observations**

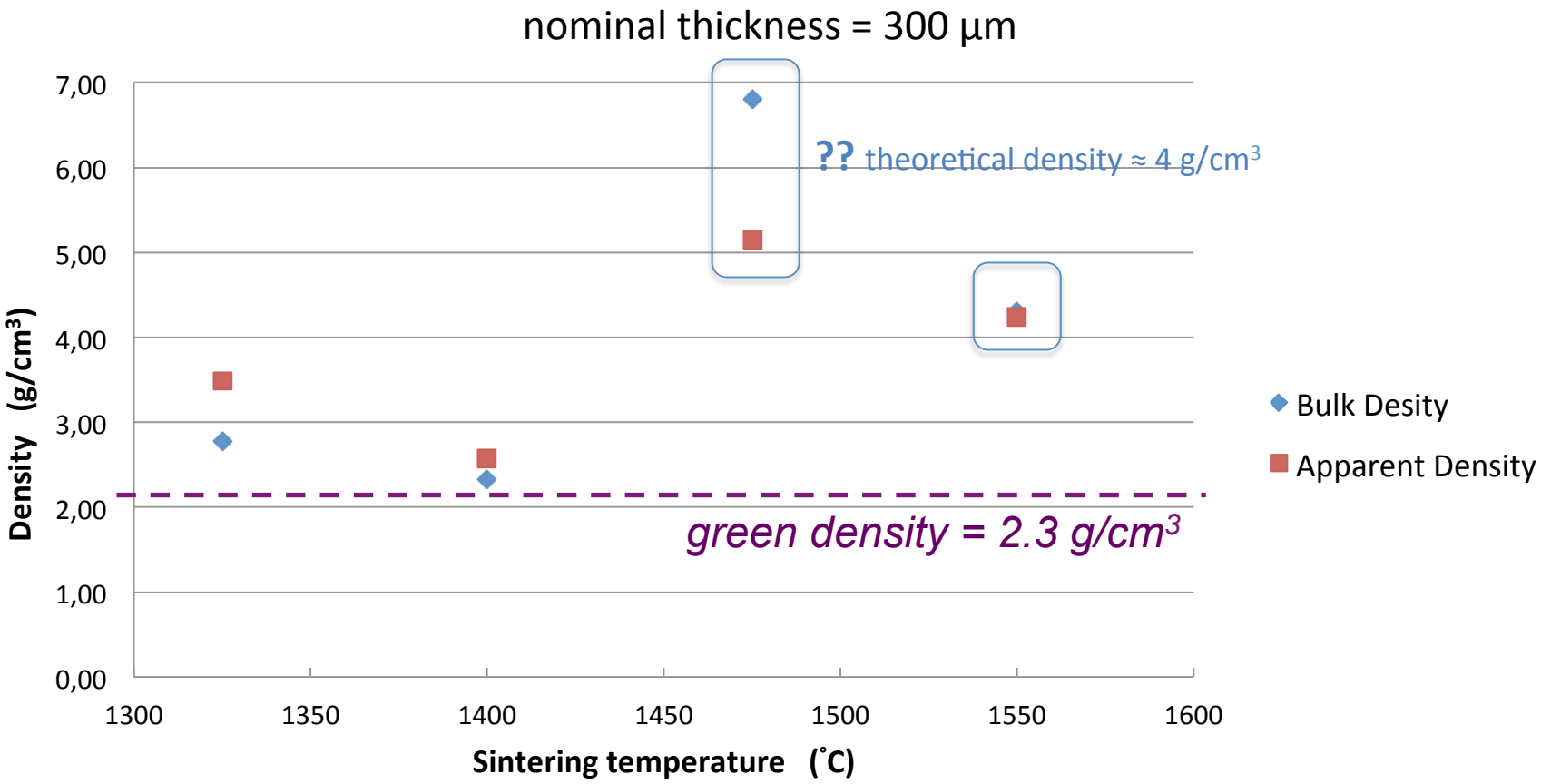
$$\sigma_f = \frac{3F}{2\pi h^2}\left[(1-\nu)\frac{D_S^2 - D_L^2}{2D^2} + (1+\nu)\ln\frac{D_S}{D_L}\right]$$



Results

Density

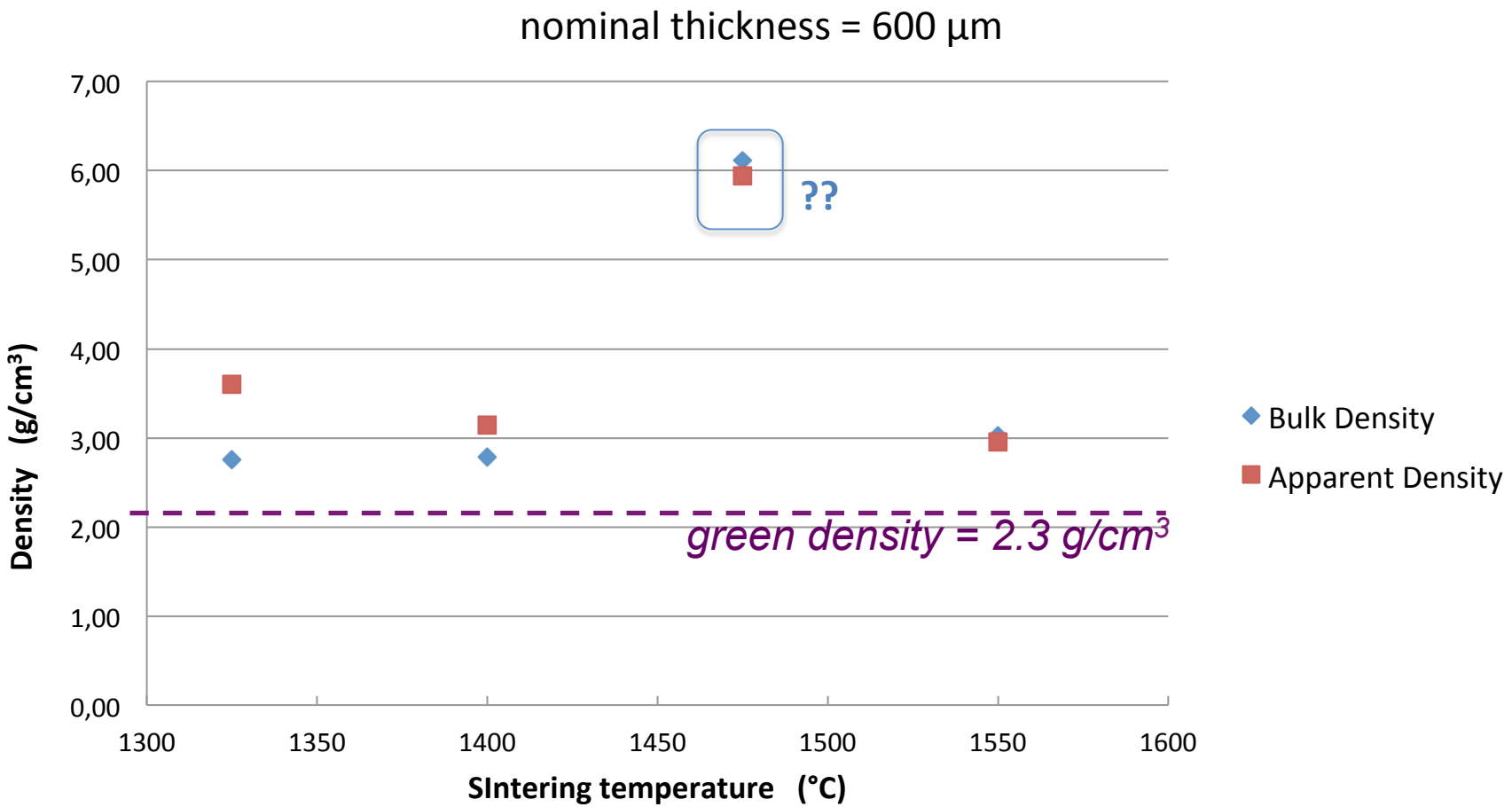
average? std deviation? all data?



Results (2)

Density (2)

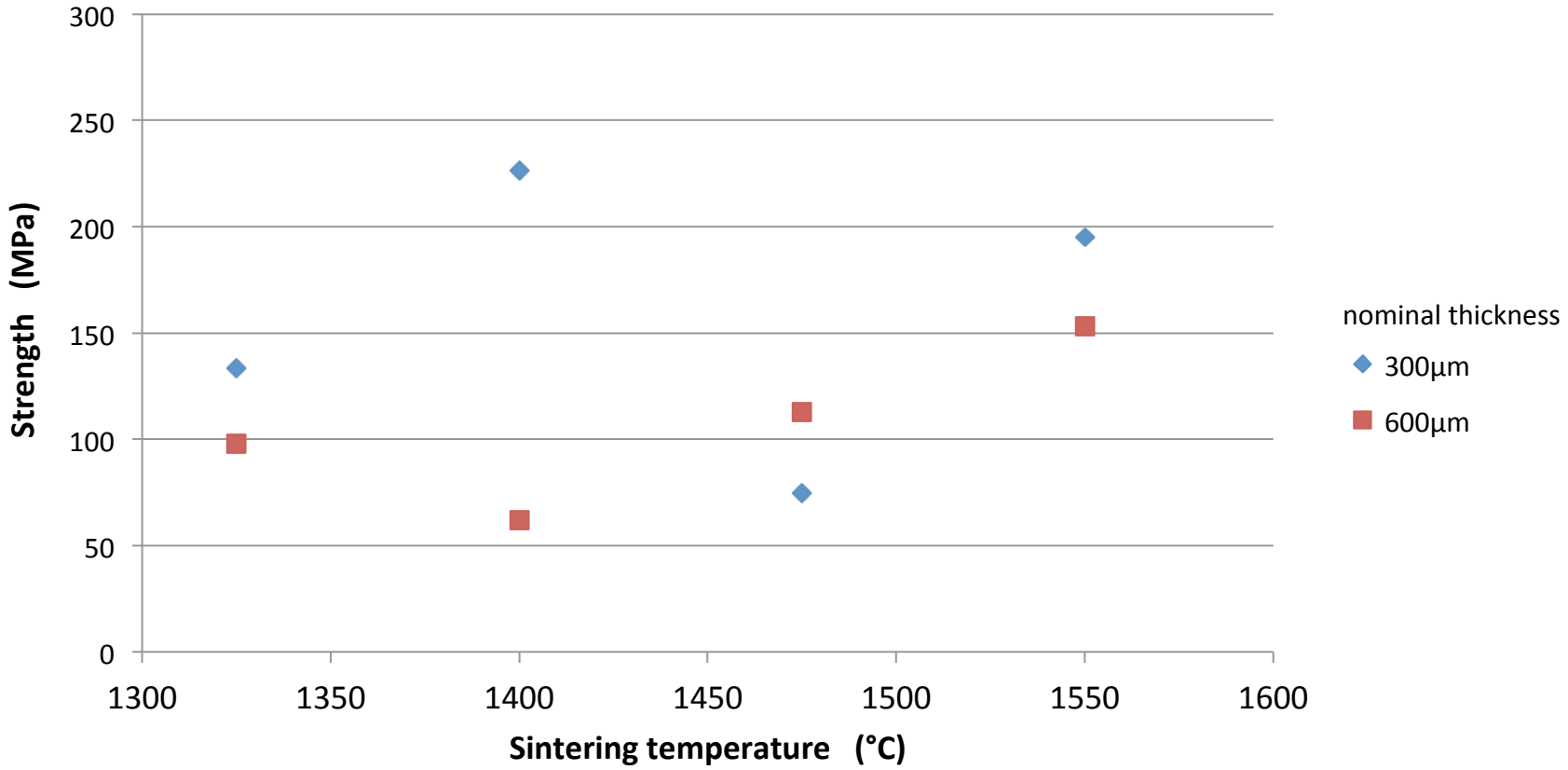
average? std deviation? all data?



Results (3)

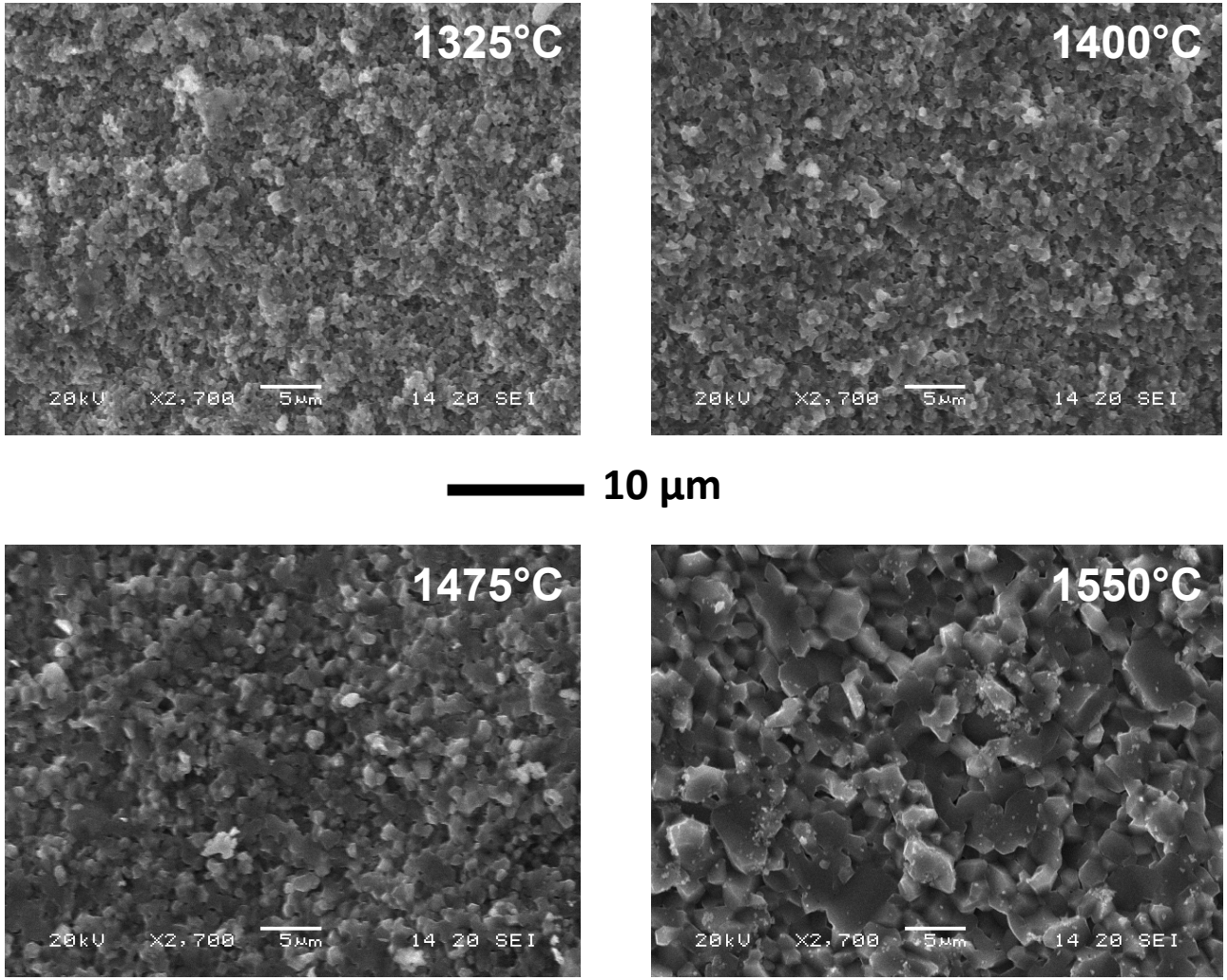
Flexural strength

average? std deviation? all data?



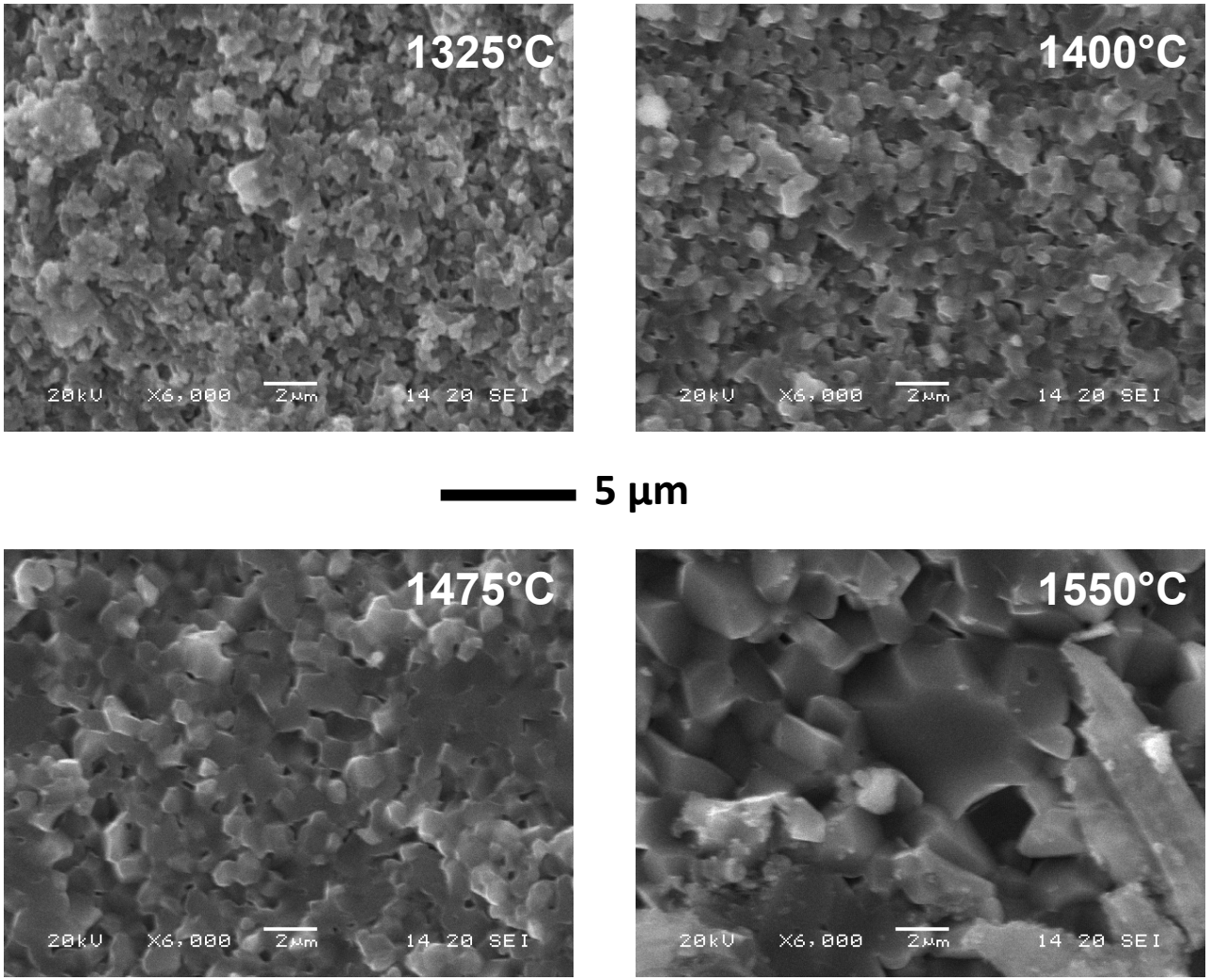
Results (4)

SEM images



Results (5)

SEM images (2)



Summary and Conclusions

- **Density and strength value show considerable scatter (error in the measurement?) and appear invariant with sintering temperature**

- **Reliable density data are always lower than theoretical value**

- **Porosity is always observed even for sintering temperature of 1550°C (although consistent grain growth is also recorded)**

- **Among the considered sintering temperatures, the optimal one is 1550°C, although probably higher temperatures are necessary for complete sintering**

THANK YOU!

Any question?