

1.1 Intended learning outcomes

-This lab aims to teach how to plan and execute a set of experiments to answer research questions. This is a fundamental aspect of experimental science.

-The lab will make the student very familiar with superhydrophobic surfaces and their characterization.

-Lab report and presentation teach result analysis and scientific communication

1.2 Labs in short

The teachers of the lab are Ville Jokinen (ville.p.jokinen@aalto.fi) and Mehran Mirmohammadi (seyed.mirmohammadi@aalto.fi).

The students have been randomly divided into five groups. Each group has their own task (separate document) that gives some background on the research topic, some goals and what materials are available in what amounts.

Groups have some days after the kickoff session to come up with a preliminary research plan, especially what to do in the first lab session. The groups discuss their preliminary plans and ask any questions they need to from the teacher and the assistant in a 30 minute Zoom session. Based on this discussion, the group then refines their plans for the first lab session and the goals of the lab work as a whole.

The group then comes to the first lab and makes first surfaces. Depending on the project, first characterization can or cannot be done in the first lab session (some processes have 24 hour steps).

The group (by themselves) discusses what was achieved in 1st lab and what should be done in 2nd lab. There is no organized meeting with the teachers but if something is unclear (e.g. is thing X available?, email the teachers).

This is repeated for the 3rd lab, after which the group hopefully have results generated that can be analyzed.

Hints:

-3 lab sessions from start to finish is not that much and your research plan should not be too ambitious compared to the time available.

-Research plan very well might need to be adapted on fly after first lab session. Maybe the group was intending to study property X after fabrication process Y. But if process Y did not work then the group has a new goal in testing new parameters to make process Y work.

1.3 Groups

Group 1: Asplund, Lehto, Panisset, Vehviläinen, Vidgren

Group 2: Haapala, Jussila, Korttesmaa, Moerlen, Shalah

Group 3: Best, Kuutti, Metsola, Pajunen, Sanouillet

Group 4: Ahlstedt, Kangas, Kuusisto, Ruismäki, Vieillescazes-Delrieu

Group 5: Aso, Heikkilä, Jääskelä, Nyman, Sharma

You will find in MyCourses a separate forum accessible to only your group if you need to use it to e.g. change contact information or otherwise use it for sharing e.g. teams links.

You will also find your groups specific assignment and instructions, only visible to your group.

1.4 Available times for meeting with teachers before first lab session

Monday 12.10 9:00-9:30

Monday 12.10 9:30-10:00

Monday 12.10 15:30-16:00

Monday 12.10 16:00-16:30

Tuesday 13.10 15:30-16:00

Tuesday 13.10 16:00-16:30

Wednesday 14.10 9:00-9:30

Wednesday 14.10 9:30-10:00

Book a timeslot for your group in the Wiki, Zoom link is also there. Not everyone from the group is required to join but the more are there the more beneficial it is for your group.

Be prepared to show the teachers some document so that your plans are easier to understand other than just a verbal description (it is anyway a really good idea to write down your plans).

This is just for guidance and it is not graded.

1.5 Deliverables and grading

The deliverables that are graded are:

1. Report, part individual part group, 17 points, **6.12.2020 23:59**
2. Presentation, group, 8 points, **2.12.2020 12:15-15**

See instructions and grading in sections 3 and 4

2 General information:

2.1. Corona rules:

Labs are at low capacity to avoid crowds.

Most important: Do not come to the lab if you feel sick. This overrides the rule that everyone should come to the lab at least once. If you are sick at your lab times, then try to contribute more on the writing / presenting side.

Safety gear: Lab jacket, goggles, disposable gloves (gloves are provided from the lab)

If you need a lab jacket we will loan it to you for the duration of the course (you take it home with you in-between), no lab jacket sharing.

Maintain 1-2 m distance at all times. When just standing around, 2m, when working together, still maintain 1m.

A facemask is recommended (as per new Aalto guidelines). Also, koronavilkku software is recommended.

Remember good hand hygiene and coughing practice and overall common sense.

2.2 Important Dates:

7.10.2020 12:15-13:00 Project launch

Week 42 (12.10-16.10): 30 minute discussion on your groups Lab plans, timeslots in MyCo

19.10 – 5.11 Labs are during this period, time reservations in MyCo

2.12.2020 12:15-15:00 Final presentation

6.12.2020 23:59 Final report due

2.3. Labs:

IceCube and Snow, CHEM building teaching labs

Capacity: 10 students, this can be 1-3 groups working simultaneously but 10 student capacity cannot be exceeded.

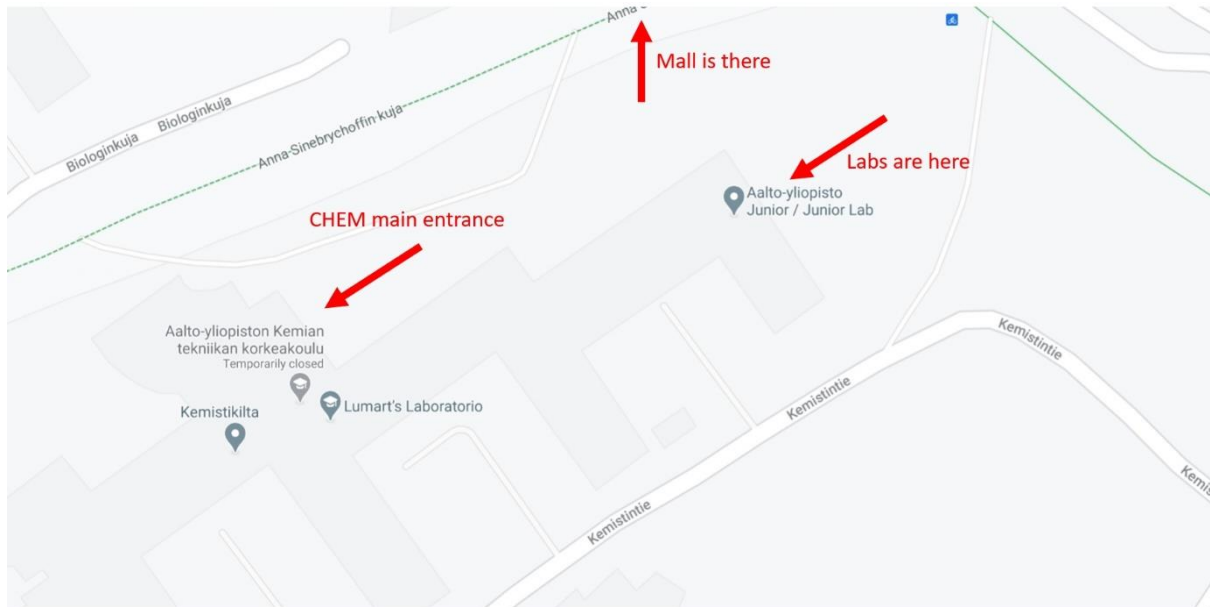
Lab times:

mon 19.10 9-12, tue 20.10 9-12, thu 22.10 9-12, fri 23.10 9-12,

mon 26.10 9-12, wed 28.10 9-12

mon 2.11 9-12, tue 3.11 9-12, wed 4.11 9-12, thu 5.11 9-12

-Note: lab is available for 3 hours, but your group can choose to only use for example 2 hours of it. Especially relevant for the Wednesday timeslots if you need to travel to participate afterwards in the remote class session.



3. Lab report

Since large part of the work is done with shared decisions by the group, the lab report also needs to be partly shared (but we do want to include an individual element also.) The structure of the lab report will be as following.

Use the headings 1-5 in your report.

All group members will have identical sections 1-3.

Everyone has their own sections 4-5.

Everyone returns the report as a single file to MyCourses. Include your name and student number in the front page.

17 points total

1. Introduction (shared, 2 points): Very short (about 0.5 pages) of shared background information that the group has found together to be relevant for the tests they are making.

2. Experimental (shared, 3 points): With enough accuracy that your work could be repeated, explain all the fabrication and characterization (and other) steps that your group did in the lab.

3. Results and analysis (shared, 6 points): Present your groups results, all sliding angles, contact angles, other characterizations and all raw images of the samples you want to show. If you have a lot of images or data, you can expand results into an appendix. Analyze the results and discuss them in context of the task given.

4. Comparison to literature (individual, 3 points): about 0.5-1 pages, about 2-4 citations. Compare the results (and the analysis) your group has obtained to relevant works in the literature.

5. Proposed next steps (individual, 3 points): Here conclude what would you study next based on the experiments and analysis you already did, (max 0.5 pages).

-If a section is marked **shared**, it means that the group prepares that section together and all group members have that section identical in their reports. If a section is marked **individual**, everyone has his or her own version in the final return.

-If report is late, minus points depending on how late.

Grading notes:

1. Introduction, main criteria: concise and relevant information given.

2. Experimental, main criteria: clarity and accuracy, for repeating results

3. Results and analysis, criteria: clarity of presentation, graphs and figures are appropriately marked and cited in the usual scientific style (if unfamiliar with scientific style, look at articles or theses for reference).

The type of analysis depends on the results obtained. It could be e.g. plotting the sliding angle values from the results section as a function of some parameter and then discussing why the trend in question is observed.

When grading the analysis the main thing I will think about is if there is some further analysis that I could have been **easily** made from the results presented that would have advanced the understanding of the research question. If not, then the analysis has been good. I am not expecting miracles in the analysis but pragmatic/routine result analysis like graphs, averages and comparisons. (You certainly can get great points for some ingenious and unexpected analysis but that is not the expectation.)

4. Comparison to literature, main criteria: The references were relevant and the comparisons sensible. Note that the expected level of relevance varies from topic to topic, some have closer parallels in literature.

5. Proposed next steps: You will get good points if your next steps are pragmatic and sensible. The plan is to possibly include some student ideas to next years lab. So think if what you are suggesting would be possible with the resources available (small things can of course be acquired). Think also if your suggestion would advance the knowledge on the topic if the experiments were made. Note: you do not need to have all details figured out, that will be for next year's students to do.

NOTE:

Grading of sections 2 and 3 also takes into account how many and how sensible experiments the groups made. Too little done is bad but on the other hand the best result is to make a good amount of sensible test that work together to answer some key research question.

How good the final surfaces are has no effect on the grade. Some projects will very easily get better superhydrophobicity than others.

4. Presentation

Presentation time is 20 minutes, with 5 minutes for discussion. Everyone should present some part, but this is not monitored or timed.

Your presentation should be about the **shared** parts of your lab report. Include the following:

1. Background of your topic
2. What experiments were performed, how were they performed, anything educational learned during experimental stage
3. Results obtained and how you analyzed them
4. Some brief shared conclusion as a group, even though those are mainly reserved for the report.
5. Especially: If you feel like during the work you learned something about superhydrophobicity, experimental science or other topics, share them with everyone so that everyone can benefit.

Grading: 8 points total

2 points: Being there and participating in your groups presentation. (you can pass even if you miss the session but you lose these two points)

2 points: the presentation has clear structure, timing and depth

4: points: the presentation is educative to the students of other groups. This includes both what you teach them about your topic, superhydrophobicity, fabrication and characterization but also any other bonus teachings.

Other than being present, the whole group gets the same points for the presentation.