

## Annual report for SNS research projects

Submit the report to [sns@slu.se](mailto:sns@slu.se) by 24:00 CET, 1<sup>st</sup> of March, 2020 and 2021, at the latest.  
The report should not exceed 2000 words (including words in the template).

Please adjust the box size according to the length of your answer.

1. Project title:	Where is the water in acetylated wood? Studies of amount, location and state of water in acetylated wood for development of more durable wood products
2. Reporting year:	2020

3. Project coordinator:	Maria Fredriksson
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Address:	Building Materials, Lund University, Box 118, 221 00 Lund

### Activities during the reporting year:

4. Project status
<p>a) Does the project develop according to the plans? b) Describe the activities during the reporting year</p>
<p>a.</p> <p>The project is generally developing according to plan, but some activities has been moved to 2020, while other activities that were supposed to be performed in 2020 has been done in 2019 instead.</p> <p>b.</p> <p><b>Experimental work:</b></p> <p>Wood modified by uniform acetylation and acetylation of the interface between the cell wall and lumen surface was characterized by Raman micro spectroscopy. This was done to get spatial information of the wood chemistry on cell wall level.</p> <p>Pressure plate measurements of untreated and acetylated wood has been performed. These were made for both uniformly acetylated specimens and specimens where the interface between the cell wall and the lumen surface was acetylated. These pressure plate conditioned specimens as well as water saturated specimens of the same modification types where then measured by Low Field Nuclear Magnetic Resonance (LFNMR) to study location of water within the wood structure. Sorption calorimetry was performed to study enthalpy of sorption (state of water). Initial measurements were performed by a master student, and since the results were interesting we continued with further measurements. Hydroxyl accessibility, i.e. the hydroxyl groups available for water molecules, was determined using a sorption balance. As the LFNMR measurements, also sorption calorimetry and hydroxyl accessibility were performed on acetylated samples.</p> <p>Additionally, we have prepared specimens for degradation experiments, and conditioned specimens for cryo-LFNMR measurements. Both to be performed in 2020.</p> <p><b>Meetings:</b></p> <p>We had a project meeting in Lund 17-18 June, 2019. During the two days, all participants presented ongoing research relating to the topic of the project in order to identify possibilities for further collaboration. With basis in these presentations, we discussed how we could expand our collaboration. We also took a tour in the laboratory to look at the equipment available at Lund University, discussed an application to BBI (Biobased Industries Joint Undertaking, Horizon 2020) with deadline in September. In addition, we had a brainstorm and tried to list possible funders and projects ideas for future projects.</p>

<p><b>Conferences:</b> All participants in the projects attended WSE2019 – the 15<sup>th</sup> Meeting of the Northern European Network of Wood Science and Engineering 9-10 October, Lund Sweden.</p>

<p>5. List the published outputs during the reporting year (peer-reviewed articles, other publications):</p>
<p>Ramūnas Digaitis, Lisbeth G.Thygesen, Emil E. Thybring, Maria Fredriksson, Targeted acetylation of Norway spruce tissue and its effect on moisture states in wood, presented at WSE2019 – the 15<sup>th</sup> Meeting of the Northern European Network of Wood Science and Engineering 9-10 October, Lund Sweden.</p> <p>Lisbeth G. Thygesen, Greeley Beck, Nina E. Nagy, Gry Alfredsen, Cell wall changes during brown rot degradation of furfurylated wood as compared to acetylated wood, presented at WSE2019 – the 15<sup>th</sup> Meeting of the Northern European Network of Wood Science and Engineering 9-10 October, Lund Sweden.</p> <p>Tiantian Yang, Emil Englund Thybring, Maria Fredriksson, Erni Ma, Jinzhen Cao, Ramunas Digaitis, Lisbeth Garbrecht Thygesen, Effects of acetylation on moisture in wood, presented at WSE2019 – the 15<sup>th</sup> Meeting of the Northern European Network of Wood Science and Engineering 9-10 October, Lund Sweden.</p>

<p>6. List other practical outputs during the reporting year (websites, policy recommendations, conferences, scientific meetings, large-scale project applications, research training etc.)</p>
<p>All participants in the projects attended WSE2019 – the 15<sup>th</sup> Meeting of the Northern European Network of Wood Science and Engineering 9-10 October, Lund Sweden.</p> <p>Together with other institutions in Europe we worked with an application to BBI (Biobased Industries Joint Undertaking, Horizon 2020). Unfortunately, this application was not granted.</p> <p>Together with Chalmers, we worked with and sent in an application to Novo Nordisk Fonden, Denmark.</p> <p>PhD student Tiantian Yang, Beijing Forestry University and University of Copenhagen visited Lund University for a period of 10 weeks to do measurements.</p>

## Economic report

<p>7. Received grant from SNS for the reporting year (SEK):</p>
<p>350 000 SEK</p>

## 8. Transfer of SNS funds to project partners

Country	Partner organization	Sum (SEK)
Denmark	University of Copenhagen	100 000
Finland	-	
Sweden	Lund University	200000
Norway	NIBIO	50 000
Iceland	-	
Other countries (specify)	-	

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Total SUM		350 000
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### 9. Costs

	SNS funding	External funds*	Total*
Travel and hotel	17 885	6 368	24 253
Meeting costs	3 046	0	3 046
Consumables	14 575	0	14 575
Salary	300 054	697 919	997 974
Communication	0	0	0
Other costs (specify)	16 583	0	16 583
<b>Total SUM (SEK)</b>	<b>352 144</b>	<b>704 287</b>	<b>1 056 431</b>

\* If possible, provide details otherwise summarize the total sum for external funds and total.

Optional: Comments to the economic overview:


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I hereby declare that the above statements are true to the best of my knowledge

Main applicant's signature, place and date

  
(Signature)      Lund University  
(Institution)      27/02/2020  
(Day / Month / Year)

Signature of the head of the main applicant's research institution

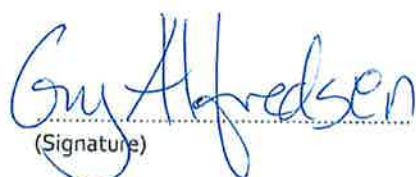
  
(Signature)      Lund University  
(Institution)      28/02/2020  
(Day / Month / Year)

Peter Johansson, Head of Department.  
(Printed name, function)

Second applicant's signature, place and date

  
(Signature)      University of Copenhagen  
(Institution)      28/02/2020  
(Day / Month / Year)

Third applicant's signature, place and date

  
(Signature)      NIBIO  
(Institution)      27/02/2020  
(Day / Month / Year)