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SHORT TERM SCIENTIFIC MISSION (STSM) SCIENTIFIC REPORT

Action: COST FP1006

Date of the visit: 20th January-21th February 2014

COST STSM Reference Number: COST-STSM-FP1006-16309

STSM Research Theme: Influence of Zinc based plasma treatment at atmospheric pressure against UV

STSM Applicant: Ahmet CAN, Forest Industry Engineering, Forest Biology and Wood Protection Technology, Bartin University, Turkey

Host: Prof. Dr. Wolfgang Viöl, University of Applied sciences and Arts, Göttingen, Germany

STSM Scientific Report Contents:

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1. Purpose of the STSM

The primary goal of this STSM, we plan to study surface properties of wood to be improved before exposure to UV test. Plasma technology used for this purpose under STSM program. Prof. Dr. Wolfgang Viöl from University of Applied sciences and Arts, Göttingen have worked long time on the surface modification using plasma technology. I should admit that this was one of the main reasons why I chose this University for my visit.

The target institute had considerable progress on plasma modification not only with wood material but also other materials. It was useful to study on plasma technology with novel coatings and preservative systems in order to prolong service life of wooden material particularly for outdoor conditions which is known surface modification. Surface modification of wood is used to directly improve certain properties, for instance stability by grafting UV absorbers on its surface or to modify its surface free energy in order to make wood hydrophobic or to improve compatibility with coatings and adhesives.

In the scope of the STSM, I studied on the ongoing project regarding wood material in the host institute, as well as carry out some experiments.

In spite of short visit I believe that STSM programme will be a very useful experience for my future studies, and enable further collaboration between two institutes, finally good impact on COST FP1006 Action.

2. Description of the work carried out during the STSM

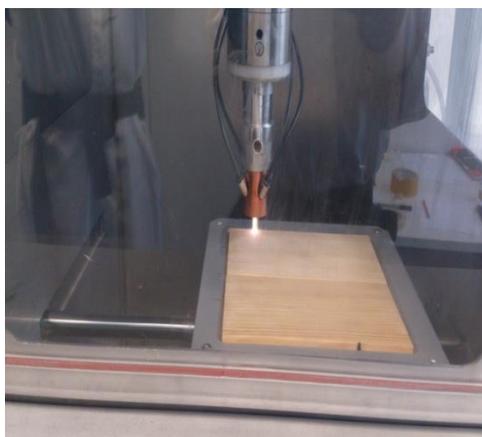
In the scope of the STSM, First week, I was worked plasma-assisted deposition of metal particles on wood in the scope of ongoing projects. XPS and UV measurement was made plasma with metal particles. I learned the purpose of utilization of these devices.

We plan to study surface properties of wood to be improved before exposure to UV test. Samples impregnated with Boric acid, Tall oil and CuA(Copper Azole) at Bartin University. Impregnated samples separated into three groups (control, plasma after impregnated and coating with ethylene). We are used two different plasma method.

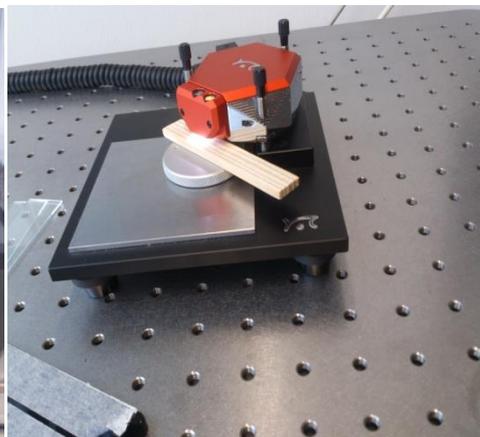
Plasma dust. In this method you can used various different metallic coating powders. We are used the metallic Zn. In this process, pine wood samples were used in 0.5 x 7.5 x 10cm size.

Plasma treatment performed with ethylene. Argon and ethylene 5/1 ratio is used. Sample sizes used 0,5 x 1,5 x 10 cm. Coating the contact angle of the samples were measured after treatment.

Second and third week, we made the plasma and plasma coating. We have measured AFM with/without plasma separate from our work plan. Also, we have interpreted results of microscope images and PSEM. Finally were measured contact angle coatings of the samples. The obtained samples (with plasma and Coating) will be subjected to the accelerated weathering test.



(a)



(b)



(c)

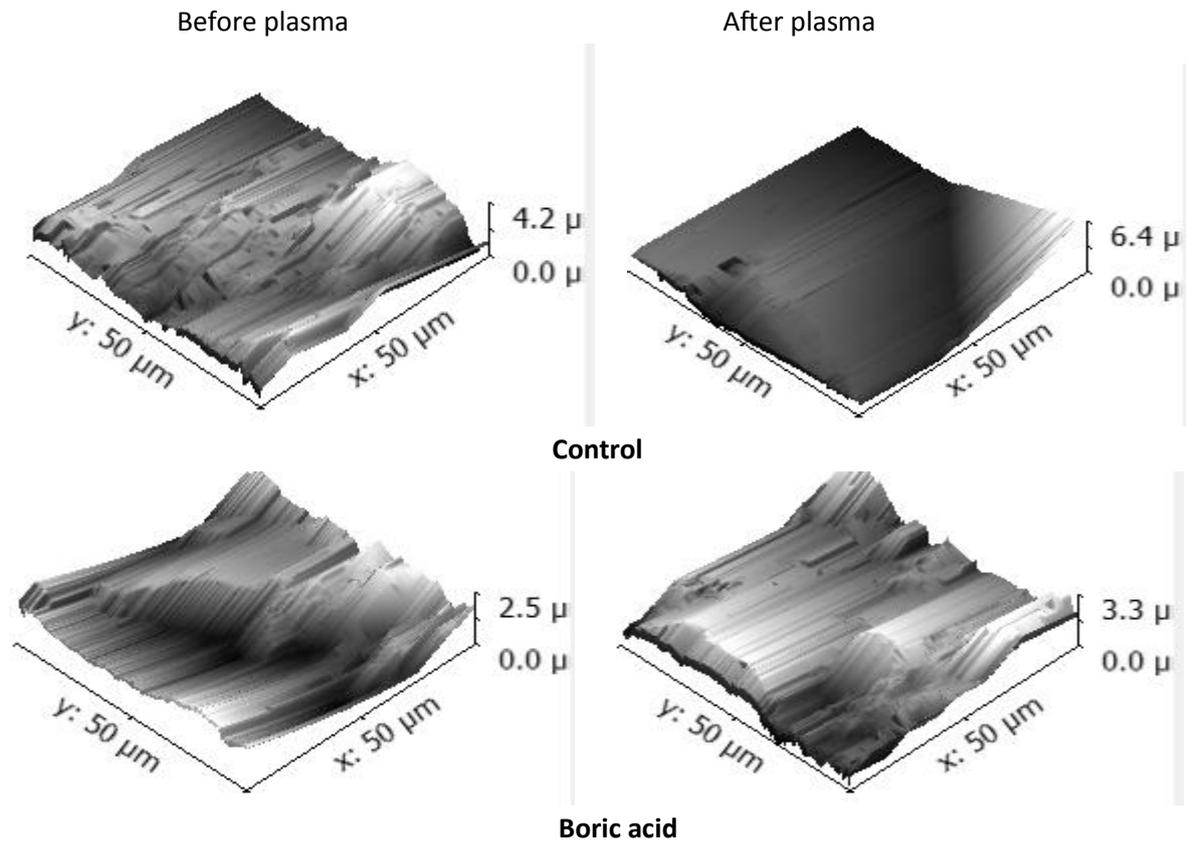


(d)

- a: Plasma
- b: AFM
- c: Contact angle
- d: Microscope

3. Description of the main results obtained

During my stay in Gottingen I learned the technique of AFM, Contact angle, Microscope image, and plasmadust method for wood. The main results which we wish to achieve will be obtained after UV test. The obtained results before UV test are described. AFM (Atomic force microscopy), Microscope image and contact angle results as it follows:



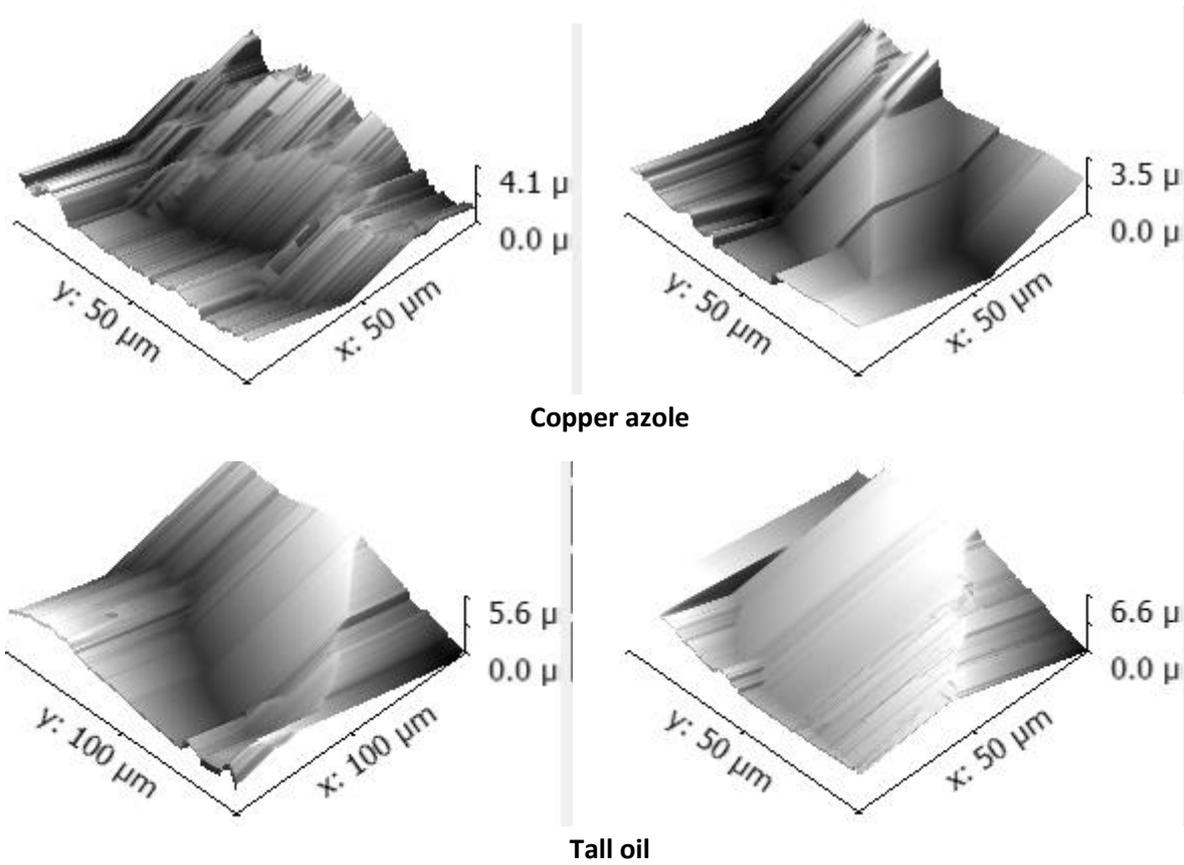


Figure 1: AFM image before and after plasma

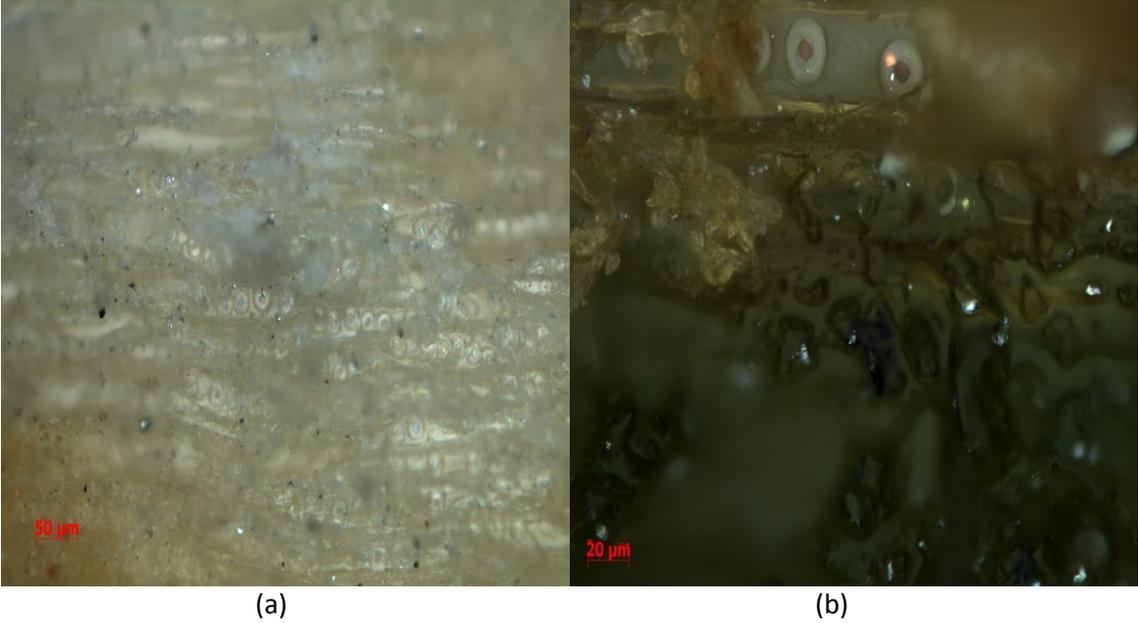


Figure 2: Microscope image after plasma (a: impregnated with boric acid b: impregnated with CuA)

Table 1: Contact angle values

	Before plasma	After plasma	After weathering
control	33,4	could not be	
Tall oil	63,65	measured	to be measured
Copper azole	86,06	because it is	
Boric acid	62,12	very low	

	Before coating	After coating	After weathering
control	33,4	62,05	
Tall oil	63,65	92,91	to be measured
Copper azole	86,06	67,87	
Boric acid	62,12	27,27	

4. Future collaboration with host institution (if applicable)

The STSM allowed me to exchange literature, knowledge, and research experiences. Directions for future collaboration were discussed during the visit, some activities were decided on: (a) collaboration through publications of from results of the study: on international journals; (b) collaboration through other works.

5. Foreseen publications/articles to result from the STSM

We are planning to prepare a joint publication on the basis of the gathered results I shall get after UV test results

6. Confirmation by the host institution of the successful execution of the STSM

The confirmation is in a separate file.

7. Other comments (if any)

This was my first STSM and I am happy to say that my experiences were very positive. This kind of funding system enables and encourages young researchers to visit colleague organisations to learn to use new devices and collect data not measurable at the home institute. Naturally the co-operation and encounters with colleagues both widened my scientific network as well as built up the professional skills.

I would like to thank the COST network for funding this visit. I would also like to thank my hosts, Prof. Dr. Wolfgang Viöl and Lena Wallenhorst for inviting me to the University of Applied Science and Arts. I would like to thank them for offering me an office space for the duration of my visit as well as for their providing me with such a welcoming and warm atmosphere.

Thank you for this opportunity to increase my knowledge and experiences, meet new people and see beautiful places. I am looking forward to continuing our collaborations very much.

February 26, 2014, Turkey

Ahmet CAN