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CELLULOSE-BASED MATERIALS –  
FROM SCIENCE TO TECHNOLOGY

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### **Prolongation of the biological durability of paper-based materials**

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#### **Abstract**

Cellulose is an ubiquitously available and renewable resource. Not least for these reasons, the use of paper and board products as building materials is increasingly in the focus of materials scientists and engineers. Although cellulose is known to be susceptible to biodegradation, not much effort has been invested yet to study the microbial colonization of paper materials under environmental conditions. To overcome these drawbacks 1. We tested honeycomb boards in field studies at three climatically different locations within Germany and – for the very first time - paper microbiome analysis were performed using Next Generation Sequencing techniques (NGS) and quantitative PCR (qPCR). 2. we newly developed aminoethyl-chitosan-dithiocarbamate (AECSDTC) with different molecular weights and characterized the substitution patterns by FTIR, elemental analysis (EA) and <sup>1</sup>H-NMR. 3. We tested the antimicrobial activity of AECSDTC paper and honeycomb board coatings against environmental isolates in the laboratory and in field studies using NGS, qPCR and ergosterol analysis.



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#### **KEYWORDS:**

paper microbiome  
paper microbial colonization  
next generation sequencing  
antimicrobial paper coatings  
aminoethyl-chitosan  
dithiocarbamates



#### **Biography**

##### Personal data:

Name: Oliver Elle  
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##### Education

2017 M.Sc. Biochemistry, University of Leipzig  
2012 B.Sc. Biology, Uni Leipzig  
2011 B.Sc. Teaching Profession (Chemistry | Biology),  
University of Leipzig  
2004 Abitur, Friedrich-Schiller-Gymnasium, Bautzen

##### Academic positions

Since Dec. 2017 Ph.D. student at Macromolecular Chemistry and Paper  
Chemistry, Technical University of Darmstadt

July 2014 – Oct. 2017 Scientific assistant, Uni Leipzig:  
Systematic Botany and Functional Biodiversity  
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##### Research interests

- interaction of paper and environment
- paper microbiome
- antimicrobial and biodegradable paper coatings