

Electro osmotic pulsing technology (PLEOT) – a new potential solution for protection of cultural heritage

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Abstract

Wood protection and control of infestation in buildings and other wooden cultural heritage objects is mainly based on chemical-, gas- and heat treatments. Degradation of wood is not only caused by fungi or bacteria but also by insects. Termites have been a potential risk to wooden structures not only in the warmer regions of our continents but also beyond the regions of their natural habitat due to transport of wood.

A new environmental friendly wood protection system has been tested on wood destroying fungi and termites. Wood protection by means of electro osmotic pulsing technology (PLEOT) can preserve wood in service without using any chemical protection at all. The system can easily be installed and is very low in maintenance costs.

The results show no mass loss of PLEOT protected beech and Scots pine sapwood samples exposed to the white rot *Trametes versicolor* for 4 and 8 weeks. Termite attack could slightly be reduced by using this technology on Scots pine sapwood samples.

1. INTRODUCTION

Wood can be converted back to carbon dioxide in different ways [1]. This conversion can be based on various organisms and different chemistry. Another more subjective term for this conversion is degradation. Degradation of wood is often connected to wood moisture content and its variation which leads to dimensional changes of wood. Moisture is also described as the main degradation factor for wood [2].

Wooden products can be protected by either constructive protection or by the use of wood preserving chemicals. Modern wood protection systems such as wood modifications are not only increasing durability of wood but improving also other properties e.g. dimensional stability by changing the wood–water relations.

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A new technology against fungal attack and termites in wood has been tested [3]. The technology, wood protection by electro osmotic pulsing (PLEOT), is based on the application of an electric field. Other material, such as concrete, can be dehydrated when electrodes are placed across the material and a low direct current is applied. A certain pulsing pattern carries ions from one electrode side to the other bringing with them water molecules that clump around the ions.

Wood has a low specific conductivity and is considered as a dielectric material [4]. Water plays therefore an important role. With increasing wood moisture content the conductivity is increasing. At the same time, wood is naturally protected against fungal attack at a wood moisture content <20%. Increasing wood moisture content creates a favorable environment for fungi development.