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Author: P. Gascón-Garrido N. Mainusch H. Militz W. Viöl C.

Mai

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ACCEPTED MANUSCRIPT

Effects of copper-plasma deposition on weathering properties of wood surfaces Running title: Weathering of copper-plasma coated wood

P. Gascón-Garrido^a, N. Mainusch^{b,c}, H. Militz^a, W. Viöl^{b,c}, C. Mai^a

^aWood Biology and Wood Products, Georg-August-University Göttingen, Büsgenweg 4, 37077 Göttingen, Germany

^bLaboratory of Laser and Plasma Technologies, University of Applied Sciences and Arts, Von-Ossietzky-Straße 99, 37085 Göttingen, Germany

^cFraunhofer Application Centre for Plasma and Photonics, Von-Ossietzky-Straße 100, 37085 Göttingen, Germany

Highlights

Copper micro-particles were deposited on wood surface using plasma.

Wood micro-veneers were exposed to artificial weathering.

Blue stain resistance of copper-plasma coated wood was assessed.

Z-strength of micro-veneers was enhanced due to copper-plasma deposition.

Copper-plasma coating imparts resistance to blue stain.

Abstract

Thin layers of copper micro-particles were deposited in the surfaces of Scots pine (Pinus sylvestris L.) micro-veneers using atmospheric pressure plasma to improve the resistance of the surfaces to weathering. Three different loadings of copper were established. Micro-veneers were exposed to artificial weathering in a QUV weathering tester for 0, 24, 48, 96 and 144 h following the standard EN 927-6 [1]. Mass losses after each exposure showed significant differences between copper coated and untreated micro-veneers. Tensile strength was assessed at zero span (z-strength) and finite span (f-strength) under dry conditions (20°C, 65 % RH). During 48 h, micro-veneers lost their z-strength progressively. In contrast, copper coating at highest loading imparts a photo-protective effect to wood micro-veneers during 144 h exhibiting a z-strength retention of 95 %. F-strength losses were similar in all copper treated and untreated microveneers up to 96 h. However, after 144 h, copper coated micro-veneers at highest loading showed significantly greater strength retention of 56 %, while untreated micro-veneers exhibited only 38 %. Infrared spectroscopy suggested that copper coating does not stabilize lignin. Inductively Coupled Plasma revealed that micro-veneers coated with the highest loading exhibited the lowest percentage of copper loss. Blue stain resistance of copper coated Scots pine following the guidelines of EN 152 [2] was performed. Additional test with different position of the coated surface was also assessed. Copper coating reduced fungal growth when coated surface is exposed in contact with vermiculite. Spores of Aureobasidium pullulans were not able to germinate on the copper coated surface positioned uppermost.

Keywords

^{*}pgascon@gwdg.de, cmai@gwdg.de, Tel.: +49 551 3933558; Fax: +49 551 399646

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