

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

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

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 micro-veneers 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

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