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Thermal modification of wood and a complex study of its properties by magnetic resonance and other methods

Kondratyeva E., Safiullin K., Motygullin I., Klochkov A., Tagirov M., Reita V.
Kazan Federal University, 420008, Kremlevskaya 18, Kazan, Russia

Abstract

© 2016, Springer-Verlag Berlin Heidelberg.Thermal modification of wood is an effective method to improve some of the properties of wood. It is reported on studies of vacuum thermal-treated wood species by magnetic resonance methods. Wood species such as Scots pine (Pinus sylvestris), birch (Betula pendula), Russian larch (Larix sibirica), Norway spruce (Picea abies), small-leaved lime (Tilia cordata) were vacuum treated by heat at 220 °C with various durations up to 8 h. This selection of wood species was investigated by electron paramagnetic resonance, nuclear magnetic resonance and microscopy methods before and after the thermal treatment. Electron paramagnetic resonance experiments revealed changes in the amount of free radicals in samples with the thermal treatment duration. Additional information on magnetic relaxation of 1H nuclei in samples at room temperature was obtained. Optical microscope analysis helped to detect structural changes in the thermally modified wood. Important properties of wood such as wood hardness and humidity absorption were also studied. The original results that were obtained correlate and complement each other, and clarify changes in the wood structure that appear with the heat treatment.

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