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NOVEL THERMOSETTING WOOD COMPOSITES WITH ANTISTATIC BEHAVIOR

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The development of low temperature curing powder coatings or UV-powders enables the use of efficient powder coating technologies to coat wood-based duromer substrates in principle. However, in order to get a smooth and bubble-free film surface in a single run, the wood composites have to be dried up to a distinct moisture content before the coating process. For that reason the specific surface resistivity of wood-based composites is in the range of about 10^{12} Ω/□ at standard climate (65% relative air humidity @ 20°C). For the electrostatic application of powder coatings the specific surface resistivity has to be decreased to at least 10^{9} Ω/□ or lower. Until now antistatic properties of thermosetting wood substrates, e.g. medium density fiber boards, are reached by addition of quaternary ammonium or phosphonium salts to the bulk phase or application of an antistatic primer. However, the main disadvantage resulting from the integration of these substances into the wood composite matrix is a deficient permanency of antistatic properties and a disadvantageous impact on other material properties.
In our work novel polymeric antistatic additives based on cellulose derivatives were developed, which are reactively coupled into the polymeric network of wood composite bulk phase.
Thus, a specific surface resistivity for electrostatic spraying of antistatic wood composites has been obtained together with high permanency. Furthermore, an improvement of important properties of wood composite itself was found. In this manner increased values of transverse tensile strength and tensile strength in bending were estimated. Additionally, the swelling behavior was improved as well. This can lead to a reduction of the dosage of synthetic additives. An application of the additive to the wood surface during the wood fiber processing was found to be advantageous. Thus, a homogeneous distribution of the modified cellulose was obtained. An international patent application is in consideration.