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Research area: Process aims

Converting // Coating

Key words:

Coating, Surface treatment, Sustainability, Environmentally friendly, UV, UV-LED, Vegetable oils, barrier

TITLE:

Substitution of synthetic binders via chemically modified thermal and UV-curing vegetable oils for application on cellulosic substrates.

Background/Problem area

Paper and board as packaging solutions are of great value for economy and society. Following the latest forecasts there will be further growth in packaging sector. One can observe progressing scarcity of natural resources and increasing costs for resources and production as well as the demand for higher sustainability of products and processes. Facing these issues, energy demanding industries like paper industry has to kind of reinvent its production process. The use of renewable resources can be one step in the direction of a more sustainable production. In this context, the use of modified vegetable oils, which are used for example in wood coatings, should now be tested in the field of paper coatings. The aim of the project is to systematically eliminate drawbacks of oils, preventing their use as natural binders in paper coating. Another goal is the energetic optimization of paper coating technology. For this purpose, both UV/ UV-LED based and thermal curing approaches have to be investigated.

Objectives/Research results

The research project faces the above mentioned challenges by means of modifying several vegetable oils, in order to make them crosslinkable with thermal and UV-curing. They have as well to be functionalized in a way that they build a film on the paper substrate.

Furthermore, the processability of possible components for coatings is of high interest. Gaining knowledge in the kinetic of crosslinking such products is an important result.

In detail, different requirement profiles for certain paper substrates have to be developed. The modified oils have to stand typical processing parameters and have to be integrable in highly specialized coating colours, where they partly or fully substitute synthetic polymer binders. Goals are to achieve good barrier properties, inkjet printability and stability of the paper substrates.

Besides conventional thermal curing of coating colours we focus on the applicaton of UV-LED in our experiments to benefit from a real economically friendly process of paper coating.

Gained knowledge should be also transferred in the fiels of wood and textile coating.

Application/Economic benefits

The use of renewable vegetable oil based products in the field of paper coating results in versatile benefits. It reduces the dependence of synthetic polymer materials, which are made from petrochemical products. This can in future maybe lead to lower prices for the resources and creates an ecologically friendly image which can in contrast add value to the product. Especially if one thinks of paper in contact with food, the advantage of natural products becomes obvious. With these products one could develop barriers that require less amount of binding material.

It should be possible to develop 100 % systems of the natural binder. Because there is no water, which has to be removed, the demanded energy for the drying process can be saved. Furthermore the application of UV-LED technique for the curing of the oils saves energy.

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Remarks

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