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Research area: Product aims

Converting // Coating

Key words:

Surface structure, wetting behaviour, release, non-sticky, emptying

Title:

Microfolding of paper surfaces coated with VUV/UV-curable materials to obtain specific surface properties

Background/Problem area

It is known that beside surface chemistry the individual surface structure is highly influencing wetting behaviour. Meanwhile various top-down and bottom-up approaches are known to create distinct surface properties by modifying the structure. Never the less most of them are not feasible to be executed on paper substrates due to incompatibilities in chemistry and/or required manufacturing conditions. As a new approach the company IOT GmbH has developed resin formulations which can be photo-chemical cross-linked and structured (folded in micrometer scale) at once by excimer treatment.

In similarity to self-cleaning surfaces, a limited wetting behaviour can also show advantages in terms of emptying packages. There are various reasons why residues of the packed good should not or only minimally adhere to the emptied package:

- They can be contaminants leading to problems in disposal and recycling operations.
- They can necessitate additional cleaning or special treatment steps ahead of recycling leading to higher costs and resource consumption.
- The possibility of complete emptying makes packed products more attractive to customers (increased efficiency).

Objectives/Research results

Aim of the joint project is to develop packaging materials based on paper/paper composites that can be treated by excimer technology to obtain micro-structured surface finishes minimizing the adherence of liquid, viscous or pasty packed goods. Pre-requisite therefore, is to acquire basic knowledge about interaction of resin formulations and paper substrates as well as behavior during curing. Beside required adhesive properties also the stability as well as the recyclability of resulting composites has to be evaluated. The company IOT GmbH will develop the resin formulations for coating and the excimer treatment for folding; PTS will develop the pre-coat and adjust the required technology. Both VUV and UV techniques will be used. The following results have already been achieved by the project partners:

- Design and installation of a test system for microfolding of paper surfaces,
- Microfolding pre-tests of various varnishes on different primer layers (pure binder – feasibility) under varying conditions,
- Reduction of variables for microfolding as first technological technology adjustment,
- Development of a measurement and evaluation procedure for microfolds, fine-tuning of the method and definition of parameters describing the folding result.

Application/Economic benefits

The envisaged, surface structured paper based composites offer the following economic advantages to manufacturers, filling companies and consumers:

- Greater variety of package designs due to better adjustment of package sizes to packed goods,
- Reduced filling quantities through more complete emptying of packages,
- Better value for money because consumers can get more product from the package,
- No expensive special recycling channels necessary – packages can be recycled by conventional methods,
- Lower resource consumption and cost of cleaning, disposal and recycling processes for used packages,
- Reduced environmental pollution by residues of the packed goods.

Period of time: 01.11.2014 – 30.04.2017

Remarks

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