

Large-Scale Roll-to-Roll Patterned Oxygen Indicators for Modified Atmosphere Packages

Maristiina Nurmi^a, Jarkko J. Saarinen^a, Tommi Remonen^b, Daniel Tobjörk^c, Harri Aarnio^b,
Roger Bollström^d, Ronald Österbacka^b and Martti Toivakka^a

^aCenter for Functional Materials, Åbo Akademi University, Laboratory of Paper Coating and Converting, ^bCenter for Functional Materials, Åbo Akademi University, Department of Physics, ^cCambridge Display Technology, ^dOmya International AG

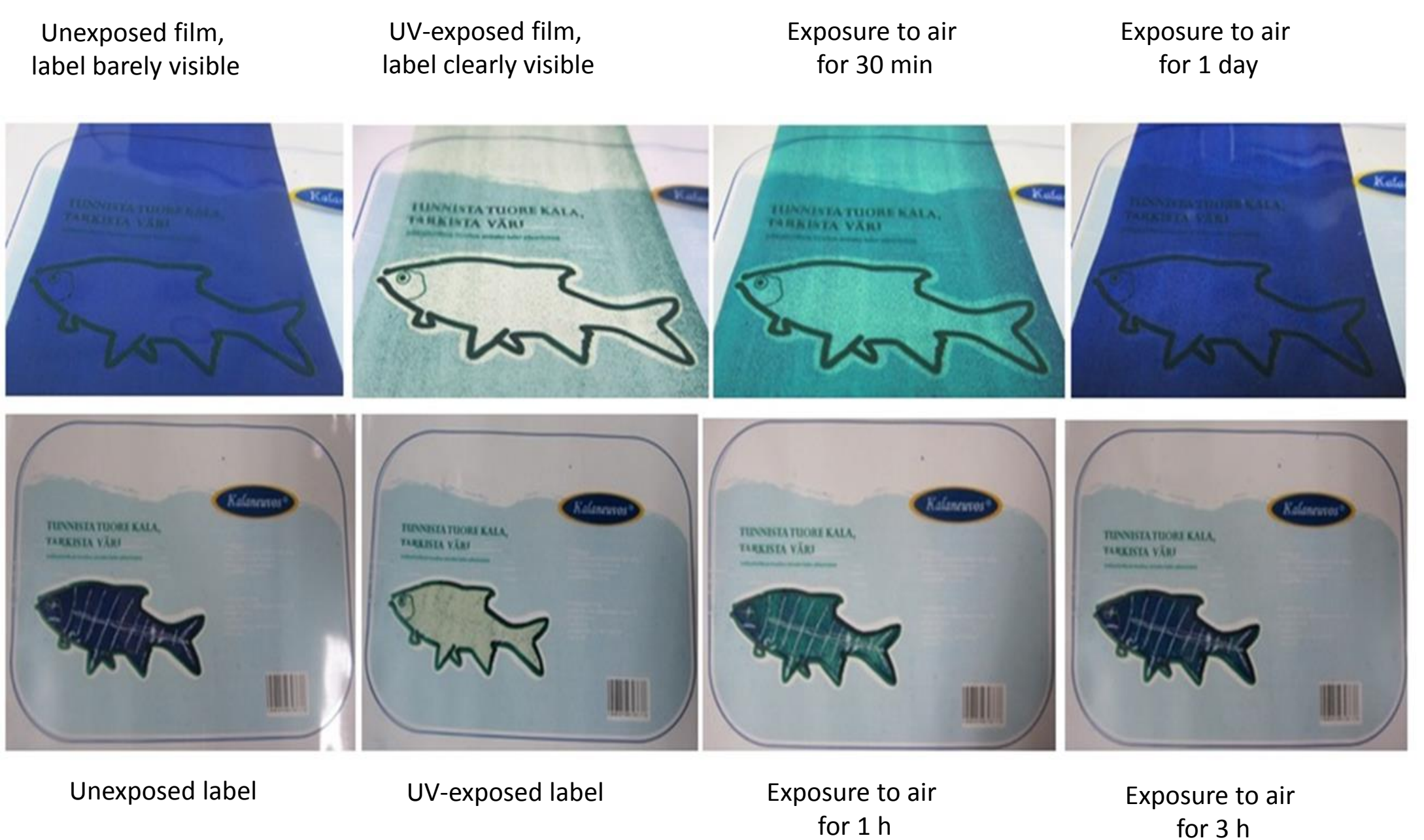
A roll-to-roll manufactured oxygen indicator on paper and plastic surfaces is presented in this work. The oxygen indicator structures were based on a methylene blue indicator ink used together with TiO₂ nanoparticles.

Introduction

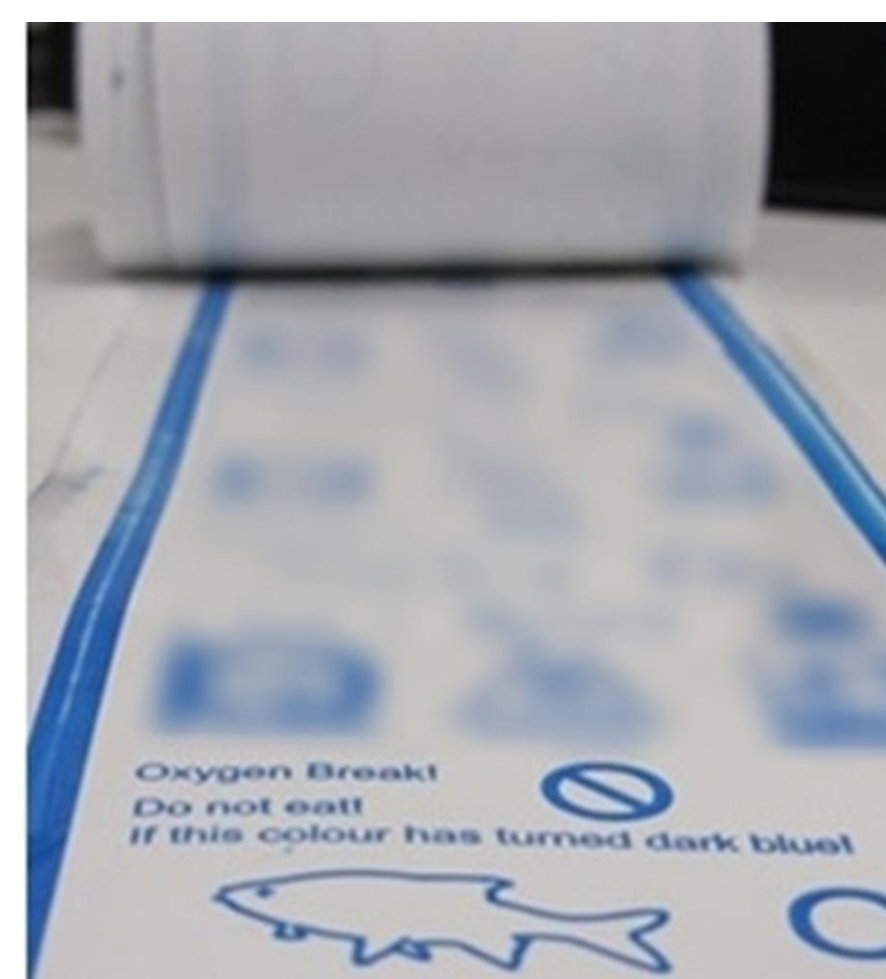
Oxygen indicators on modified atmospheric packages (MAP) can improve food safety and reduce food spoilage. There are commercially available oxygen indicators in the market but the cost of them is still high. These oxygen indicators can be printed directly or the pre-printed labels can be glued on the MAPs which makes them cost-effective.

Materials and methods

The colorimetric indicator ink was used in reverse gravure coating and flexography printing. Flexography ink was printed on both paper and plastic surfaces. The indicators were activated with UVA light.

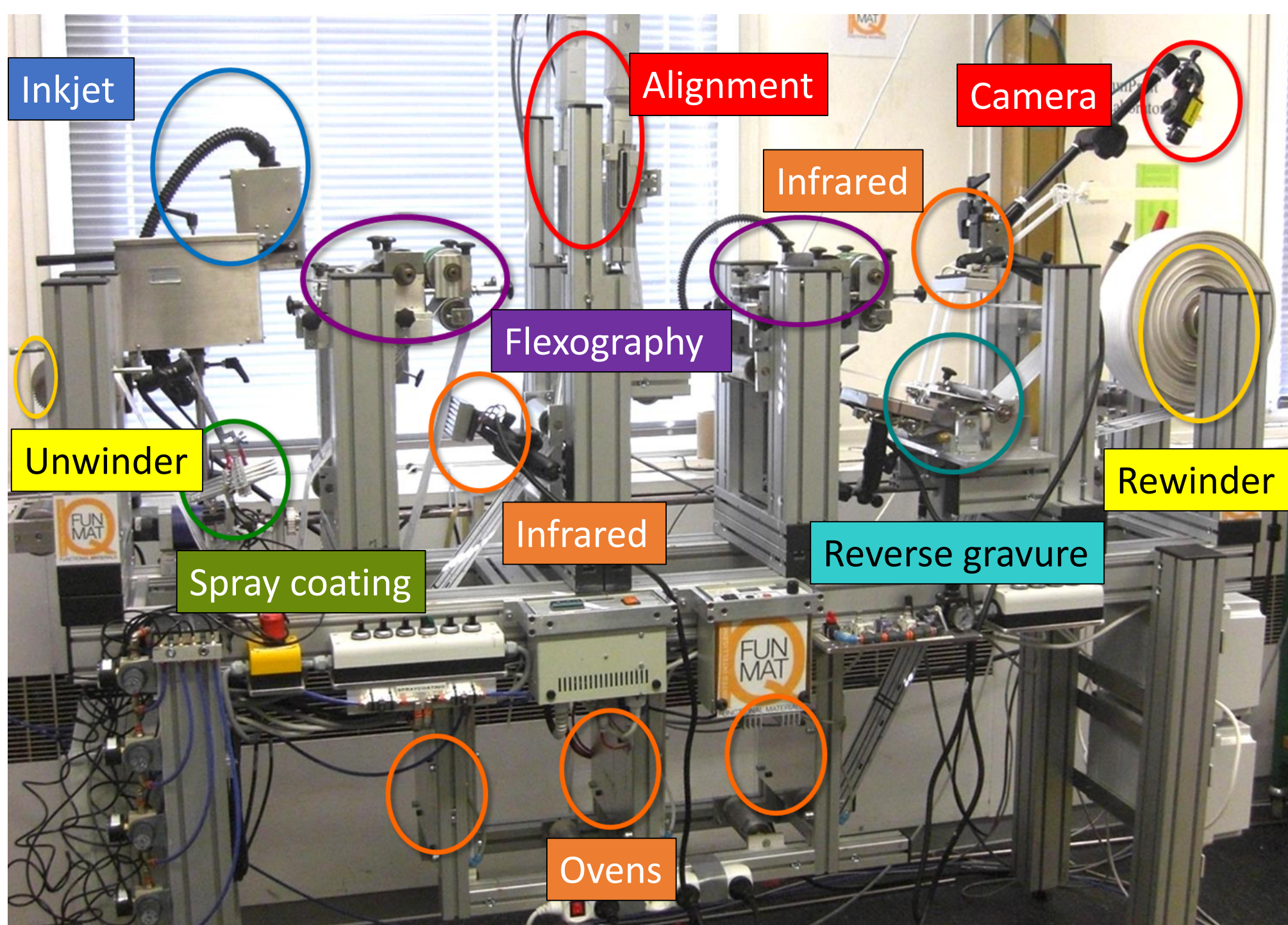


Reverse-gravure coated films; directly printed (top) and pre-printed labels (bottom)



Paper has several advantages over plastic film. It is renewable, less expensive and has a white background for good contrast.

Flexography printed labels on paper (top) and plastic film (bottom)



Åbo Akademi FunPrinter: Custom-built roll-to-roll mini pilot scale printer