Electro Optical Components, Inc.
5464 Skylane Boulevard, Suite D, Santa Rosa, CA 95403
Toll Free: 855-EOC-6300
www.eoc-inc.com | info@eoc-inc.com

Measure local heat transfer characteristics for industrial roll-to-roll drying processes

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Researchers at the Karlsruhe Institute of Technology used greenTEG's gSKIN® Heat Flux Sensor to optimize the drying process of thin functional films.

The research was published in the **Journal of Coatings Technology and Research** 12 (5) 915-920, 2015 under the title:

Local heat transfer characteristics of a slot nozzle array for batch drying of thin films under industrial process conditions

Authors: Michael Baunach, Stefan Jaiser, Philipp Cavadini, Philip Scharfer, Wilhelm Schabel

Abstract

For optimizing the drying process of thin functional films, knowledge of the relevant influencing parameters is needed. One paramount parameter for design of experimental conditions and the accurate interpretation of experimental data is the heat transfer coefficient inside a dryer. Information on the heat transfer in a dryer also facilitates a reliable transfer of results obtained in laboratory set-ups to industrial production. In this work, the heat transfer in a batch drying set-up with an array of slot nozzles is investigated. The measurement arrangement consists of a heat flux sensor mounted on the surface of a temperature-controlled plate. For validation of this arrangement, heat transfer measurements with a single round nozzle were compared to transient heat transfer experiments using thermochromic liquid crystals. The data measured in the batch drying set-up show a periodically homogenous distribution of heat transfer coefficients for the investigated 16 nozzles. This gives the possibility to dry thin films with a coating length of up to 800 mm in the set-up at constant conditions along the coating length. A prerequisite is a periodical movement with an amplitude of at least one nozzle-to-nozzle spacing.

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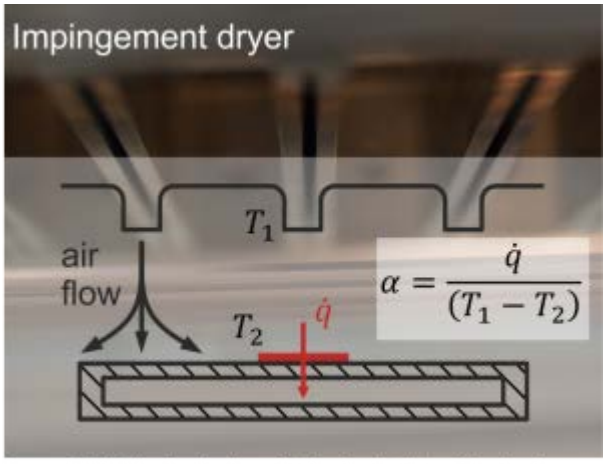

Source: Thin Film Technology, Karlsruhe Institute of Technology

"The knowledge of heat and mass transfer coefficients in specific dryers is an essential basis for numerical drying simulations and understandings to optimize product properties."

Dr. Philip Scharfer, Head Thin Film Technology (TFT) at the Karlsruhe Institute of Technology.