



TECHNOLOGY

A Method for Determining the Nearest Uniformity Producing Profile (NUPP) for the Control of Thin-Film Processing Systems with Wafer Rotation

OVERVIEW

Researchers at the University of Maryland have come up with a completely new approach to uniformity control in semiconductor and other thin-film deposition processes (e.g. chemical vapor deposition for semiconductor manufacturing) for systems where substrate (e.g. wafers, optical components, etc.) rotation is used to improve uniformity.

Based on purely geometrical characteristics of the deposition system, the algorithm developed identifies all non rotating substrate deposition profiles that result in perfectly uniform profiles under rotation. This allows the identification of Nearest Uniformity Producing Profile (NUPP) of any given substrate profile, opening the door to a new approach to uniformity control.

No current uniformity control schemes recognize the inherent information loss that occurs as a result of the wafer rotation on post processing measurements; the new algorithm makes use of all available information and leads to physically meaningful measurements.

A unique aspect of the proposed uniformity control technique is that it is based on a minimal number of physical assumptions, resulting in a technique applicable to any uniformity criterion in a wide range of thin film processing control, optimization, and design applications, including all CVD (Chemical Vapor Deposition), etch, PVD (Physical Vapor Deposition), ALD (Atomic Level Deposition), and any other thin film process with a rotating substrate, giving the technique very broad industrial impact. Thin film processing in semiconductor, optoelectronic, optical coatings, and other industries will benefit from this approach.

The control algorithm is available in the form of a MATLAB software toolbox, simplifying the implementation of the control and analysis methods. The software also includes numerous full-wafer map analysis, visualization, and model development tools.

For further information, please contact the Office of Technology Commercialization, (301) 405-3947 E-mail: otc@umd.edu.

CONTACT INFO

UM Ventures
0134 Lee Building
7809 Regents Drive
College Park, MD 20742
Email: umdtechtransfer@umd.edu
Phone: (301) 405-3947 | Fax: (301) 314-9502

Additional Information

INSTITUTION

University of Maryland, College Park

PATENT STATUS

Patent(s) pending

LICENSE STATUS

Contact OTC for licensing information

CATEGORIES

- Chemical
- Information Technology

EXTERNAL RESOURCES

- [US Patent 7,632,542](#)

PS-2005-074