# AMPHIBIAN

ILSim™ *Interference Lithography Simulator*

ILSim is a fast vector lithography simulator for high NA modeling of interferometric lithography, allowing for image prediction and optimization with the Amphibian XIS tools. Interferometric imaging, fluid immersion, polarization, film stack reflection, and field coupling can be explored for two through five beam imaging at hyper NA values. Flexible film stack input allows for the study and of optical materials, fluid media, resist materials, top-layers, and AR coatings.

Capabilities

The interactive interface to ILSim is used to define film stack data and imaging conditions. User input includes wavelength, polarization (from TE through TM including unpolarized), demodulation (for defocus correlation), illumination angle, NA, and pitch. ILSim generates 2D and 3D intensity plot output for line/space patterns (two-and three-beam interference) and 'contact holes' (four- and five-beam interference).
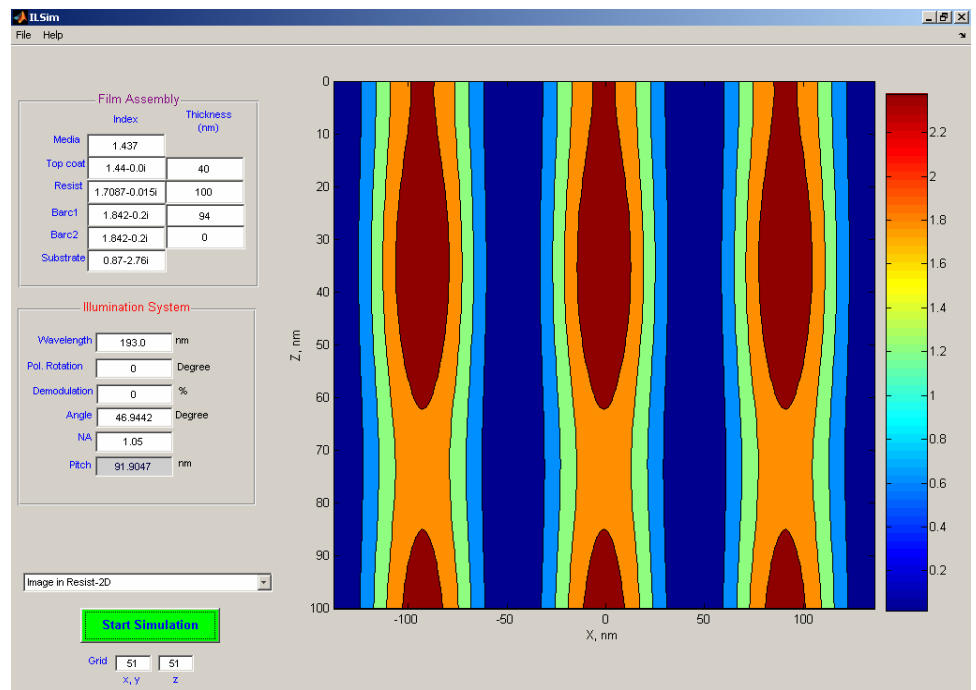
Uses

ILSim provides the insight into interference imaging necessary for process optimization at sub-65nm technology generations. As advanced resolution enhancements techniques (RET) are pushed toward two-beam imaging at extreme immersion NA values, the use of interferometric imaging and modeling becomes critical for process development
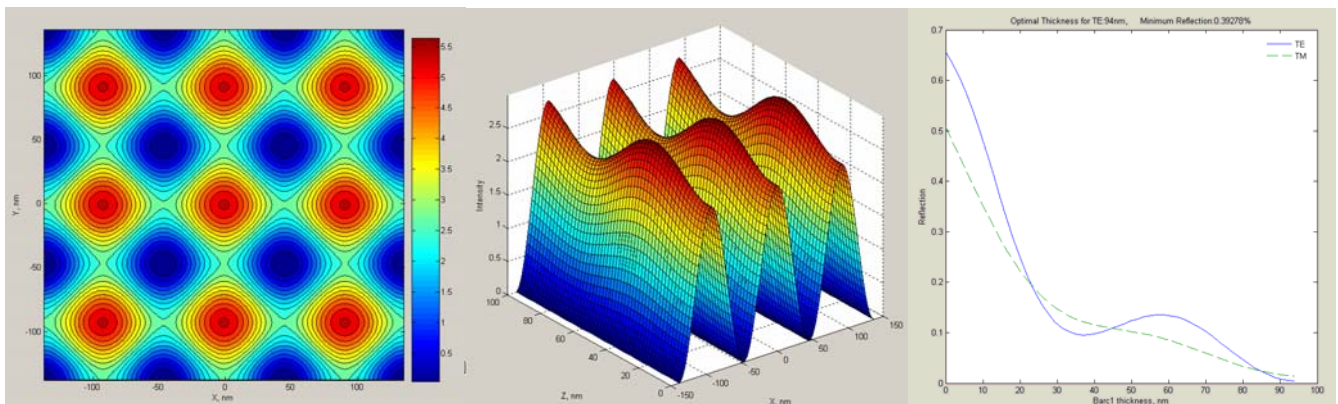
ILSim output for contact hole imaging, 3D line/space imaging, and BARC optimization

Immersion Lithography

ILSim Input	ILSim Output
Fluid properties	Image in media
Top coat	2D image in resist
Photoresist	3D image in resist
Multilayer BARCs	Two-pass exposure (top)
Substrate properties	Two-pass exposure (cross-section)
Wavelength	Polarized two-pass exposure
Polarization	Top surface reflection
Demodulation	Substrate (BARC) reflection
Propagation angle	
Numerical aperture	

Film Assembly

	Index	Thickness (nm)
Media	1.437	
Top coat	1.44-0.0i	40
Resist	1.7087-0.015i	100
Barc1	1.842-0.2i	94
Barc2	1.842-0.2i	0
Substrate	0.87-2.76i	

Illumination System

Wavelength	193.0	nm
Pol. Rotation	0	Degree
Demodulation	0	%
Angle	46.9442	Degree
NA	1.05	
Pitch	91.9047	nm

For more information on the ILSim™ interference lithography simulator or the AMPHIBIAN XIS™ excimer immersion stepper contact Amphibian Systems at sales@amphibianlitho.com or visit www.amphibianlitho.com. Copyright ©2005 Amphibian Systems.