

Monitoring Humidity in Immersion Scanner Reticle Environments to Reduce Reticle Haze Effects

ReticleSense® AMSR

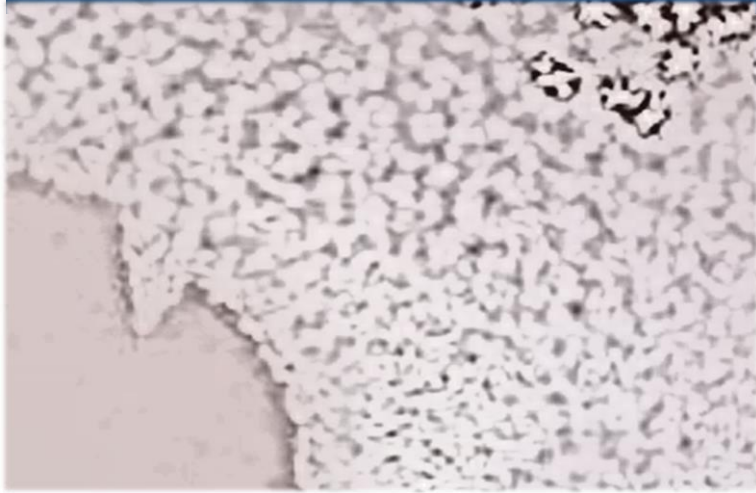
Allyn Jackson, CyberOptics at SPIE PhotoMask 2015

Reticle Haze in 193nm Immersion Scanner Environments

- Immersion technology scanners are adversely affected by a phenomenon called “Haze” when proper measures are NOT taken to measure and control it.
- There are three areas that need to be controlled to reduce Haze effects on Reticles:
 - Mask residue / Acid
 - Controlled by cleaning procedures, etc.
 - 193nm light
 - Can’t be controlled because needed
 - Water/Humidity –
 - Controlled by monitoring H₂O and eliminating H₂O sources in the total reticle environment (not just inside the 193nm scanners)

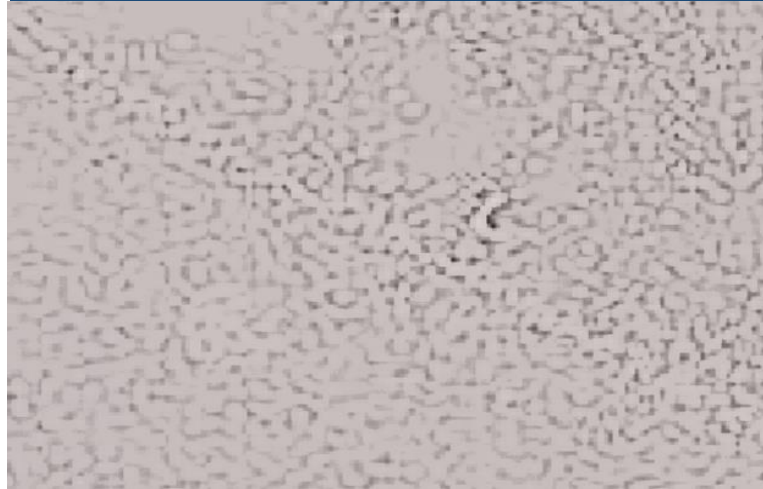
Reticle Haze Formation Accelerated When H2O Present

Optics placed in 10.000 ppm humidity environment (simulation)



Result: Haze Formation on Reticle accelerated

Optics placed in 1000ppm humidity environment (simulation)



Result: Less haze formation

For Illustration
Purposes

Problems & Limitations of Current Reticle Environment RH Measurement Methods

1. In-situ RH sensors are not needed everywhere
2. Hand-held RH sensors are inconvenient
3. Hand-held RH sensors compromise the reticle environment
 - a. If Scanner panels are opened, it might take hours to requalify the tool before going back on line
 - b. Opening chambers, stockers, RSPs, etc.. where Reticles travel contaminates the environment being tested
4. Many reticle areas are inaccessible by hand-held RH sensors or in-situ RH sensors are impractical



Hand-held RH Sensor



In-situ RH Sensor



Opening tool contaminates environment

AMSR Wireless Real-time RH Reticle Sensor



Leveling

+



Vibration

+



Humidity

- Measures H2O in the reticle environment
 - Helps identify sources of H2O to increase Reticle lifetime
- Measures X, Y & Z vibration
 - Identifies sources of reticle mishandling
- Measures X, Y & Z Inclination
 - Identifies incorrect reticle inclination
- All-in-one Reticle Form-Factor



AMSR Is an Actual Reticle That Can Travel Throughout the Entire Reticle Environment

1. Micro Environment



2. Reticle Library



Wirelessly measures RH, vibration and inclination everywhere the reticle goes



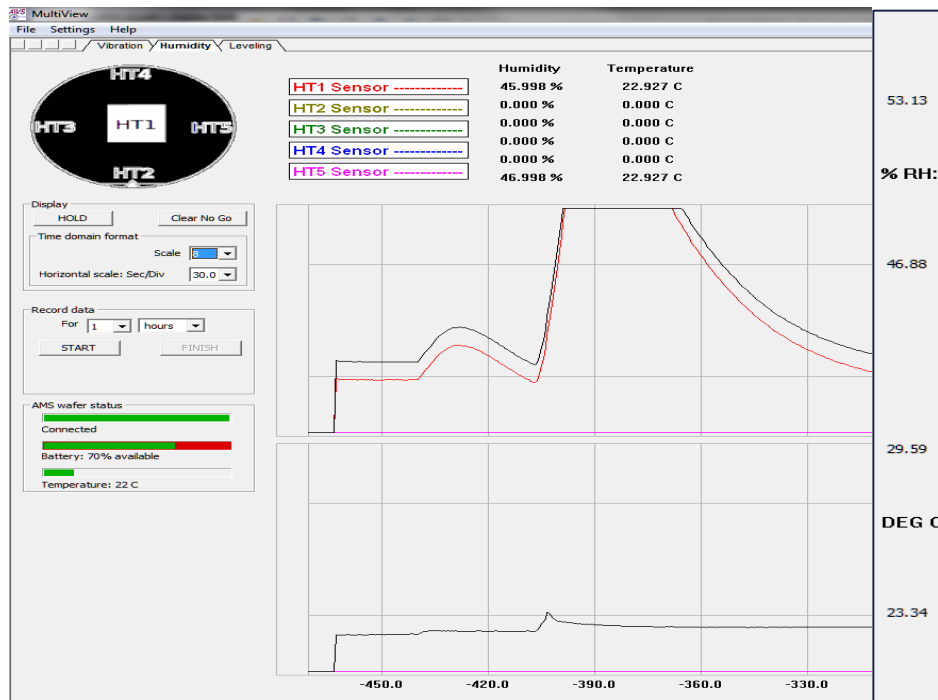
3. Reticle SMIF pods, carries. Etc...



4. Reticle Stockers

ReticleSense AMSR Humidity Functions (only HT1 Valid on Reticle Version)

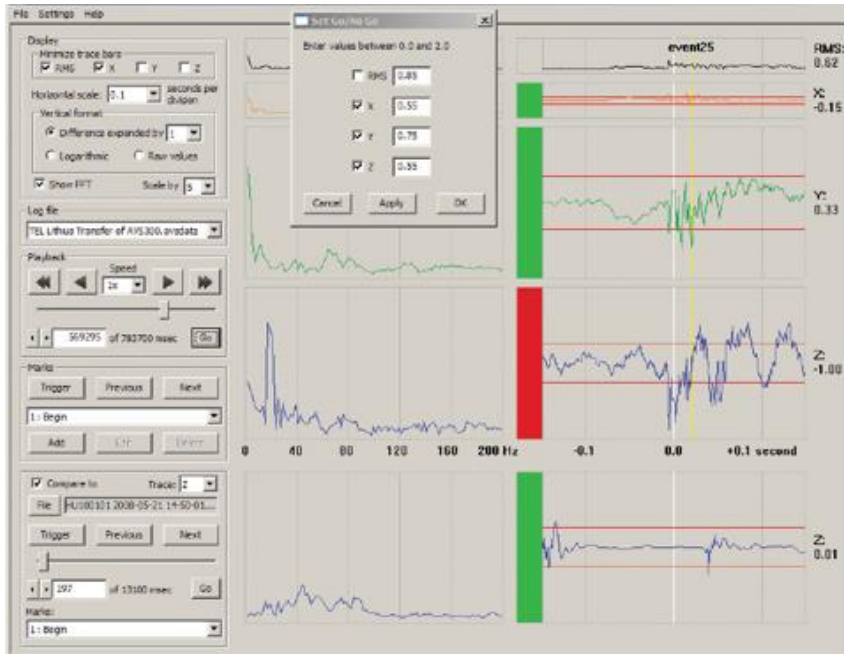
Humidity Measurement



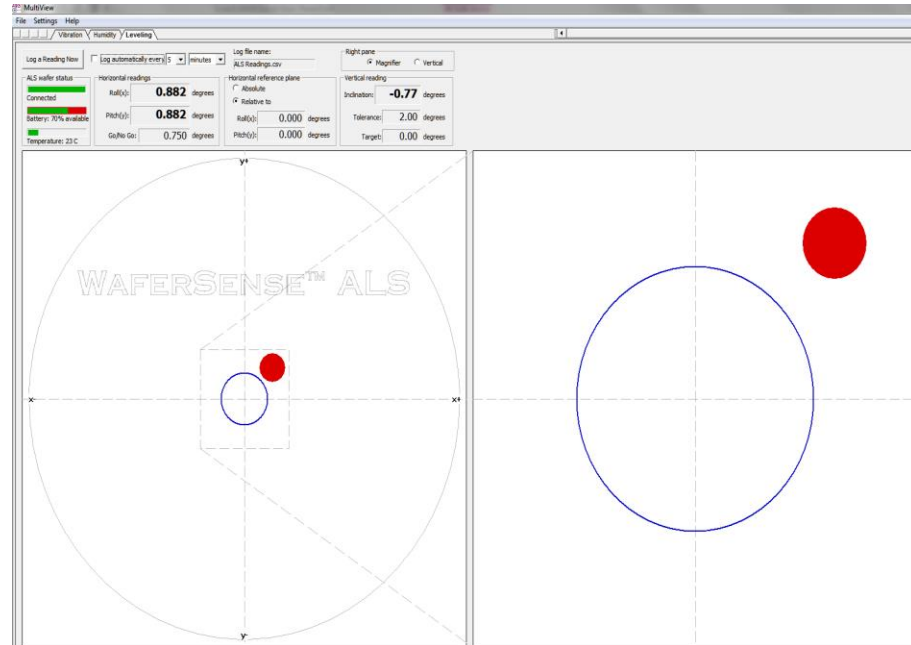
Associate RH with Specific Events and Locations

ReticleSense AMSR Vibration and Leveling Functions

Vibration Measurement



Leveling Measurement



Important Measurements to Increase Yields and Reduce Downtime

- AMSR can measure humidity in all locations of the reticle environment.
 - In emersion scanner environments monitoring humidity is critical in reducing Reticle Haze
- AMSR is an all-in-one device that also measures vibration and leveling
- Controlling inclination, humidity and vibration are all important factors in increasing yield and reducing downtime
- Equipment qualifications can be done faster with ReticleSense wireless real-time measurement reticles

Allyn Jackson

Sales Manager US & Europe / Semi Division

Toll Free: 1(800) 366-9131

Direct : +1 (763) 542.5827

Email : ajackson@cyberoptics.com

Website www.CyberOptics.com

Send questions to: cssupport@cyberoptics.com

Ferris Chen

Asia Regional Sales Director

CyberOptics Corporation

Email: FChen@CyberOptics.com

Mobile(TW): +886.912.543323

Mobile(US): +1.763.222.4494