

# Advances in Imaging and Composition Mapping Using Bright Table-Top Extreme Ultraviolet Laser Illumination

C S MENONI<sup>1</sup>

<sup>1</sup>*Electrical and Computer Engineering, Colorado State University, CAMPUS DELIVERY - 1373, Fort Collins CO, USA. Contact Phone: +19704918659  
Contact Email: carmen.menoni@colostate.edu*

Compact, extreme ultraviolet lasers (EUVL) producing pulses with energy of 10-50  $\mu$ J at wavelengths between 6.85 nm and 46.9 nm [1-4] have enabled the implementation of microscopy and holography imaging systems capable to achieve tens of nanometers spatial resolution [5-7]. The combination of nanoscale EUVL ablation and mass spectrometry has resulted in the demonstration of Extreme Ultraviolet Laser Ablation Time of Flight Mass Spectrometry (EUV TOF), a technique capable to map chemical composition in three dimensions at the nanoscale [8]. This talk will describe recent results on EUVL imaging modalities that include aerial microscopy and Fourier Transform Holography (FTH) that were used for proof-of-principle applications including the imaging of nanostructures and their dynamics and the actinic inspection of EUV lithography masks. Recent advances in EUV laser ablation mass spectrometry, a method we have pioneered to identify chemical composition of solid samples at the nanoscale will also be presented. EUV TOF has been used for composition mapping of inorganic and bio-organic samples, and in the demonstration of isotopic ratio mapping with superior lateral spatial resolution, < 500 nm and depth resolution of about 100 nm, compared to other laser-based mass spectrometry methods [9,10].

## References

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