

Status and perspectives of compact on-site EUV and soft X-ray semiconductor metrology

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Successful introduction of EUV lithography to semiconductor manufacturing has pushed achievable resolution into sub-10nm region. Accompanied by introduction of new, increasingly 3D, architectures, and new materials, this has tremendously increased requirements to the current and future semiconductor metrology. This has stimulated the development of novel approaches that are based on utilization of EUV or soft X-ray radiation. Short wavelengths on the one hand and efficient interaction of EUV radiation with matter on the other hand provides spatial and depth resolution on the nanoscale. Combined with continuous development of compact EUV and soft X-ray sources this can enable high-performance and high-throughput industrial metrology, usable not only in research and development, but also in on-site process and quality control.

The presentation will give an overview of the status of research in this area, focusing on thin film analysis and critical dimension metrology applications with compact radiation sources. Overview of the currently available radiation sources for metrology applications will be presented. Novel arising applications servicing EUV lithography development, such as a latent image metrology and refractive index determination, will be also discussed.

Finally, the perspectives and limits of EUV and soft X-ray semiconductor metrology will be discussed. Emerging scalable X-ray source concepts based of laser-driven secondary radiation will be presented and their potential for the metrology discussed.