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Design and performance of a Near Ultra High Vacuum Helium Ion Microscope BENE POELSEMA, RAOUL VAN GAS-TEL, GREGOR HLAWACEK, HAROLD J.W. ZANDVLIET, Physics of Interfaces and Nanomaterials, MESA+ Institute for Nanotechnology, University of Twente, P.O.Box 217, 7500 AE Enschede — The advent of He Ion Microscopy (HIM) as a new nanoscopic technique to image materials has enabled a new look at materials that is based on the interaction of swift light ions with matter. Initial HIM instruments have demonstrated high-resolution imaging, combined with great surface sensitivity, the ability to neutralize charge very efficiently, and with enhanced materials contrast when ion induced secondary electrons are used for imaging. To achieve ultimate performance, the chamber vacuum of the existing platform may be improved. For instance, carbon deposits due to beam interaction are readily seen due to the surface sensitivity of the technique. At high current densities the sharply focused beam may very efficiently decompose residual hydrocarbons. Not only can this obscure a clear view of the sample, thereby negating the benefits of the small spot size, it also limits the available acquisition time. This has proven extremely useful for nanopatterning for sensors, and other device fabrication applications at the sub-10nm level. However, it is undesirable when the instrument is used for materials characterization. We will discuss the basic considerations that went into the design of a Near-UHV He Ion Microscope [1]. First applications that the instrument was used for will be highlighted and its impact in surface physics and other re-search areas that require increased imaging sensitivity will be discussed. Physics of Interfaces and Nanomaterials, [1] R.van Gastel et al, *Microscopy and Microarchysis*+17, 928, 929 (2011) University of Twente, P.O.Box 217, 7500 AE Enschede

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