Last developments for high end optical gratings and microstructured optics

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In modern optics several demands exist for implementing microstructured optical components. Microstructured optics such as optical diffraction gratings are mainly influencing the performance of optical systems such as spectral imaging devices or optical spectrometers. Thus elements are designed and manufactured to the specific requirements of the optical systems. For example, the spectral sensing properties of spectral imaging devices and optical spectrometers are driven by the parameters like spectral resolution and signal-to-noise ratio. Improved performances of diffraction gratings is crucial to enhance instrumental resolution. Over recent years, ZEISS has established and optimized a systematic manufacturing process to produce high end microstructured optics such as monolithic, real blazed gratings (transmission or reflection), based on a combination of holographic recording and ion beam etching together with in-house processing of high-end grating substrates and advanced coating technologies. This paper presents recent developments on the optical design and manufacturing process of several microstructured optics. Such microstructured optics can be realized on substrates with flat surfaces or curved surfaces such as spherical, aspherical or free-form shapes. For example, in order to enhance the spectral resolution of a grating, the combination with a prism-like acting substrate is a proven, efficient and compact solution. The optical key parameters will be discussed on the basis of recent manufactured optical elements with its potential for optimization.