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	Nota di contenuto	Intro -- Acknowledgements -- Abstract -- Contents -- List of Symbols -- List of Figures -- List of Tables -- 1 Introduction and Motivation -- 2 Related Works and Basic Considerations -- 2.1 Profilometry -- 2.1.1 Atomic Force Microscopy -- 2.1.2 Confocal Laser Scanning Microscopy -- 2.1.3 Digital Holographic Microscopy -- 2.1.4 Phase-shifting Interferometry -- 2.1.5 Coherence Scanning Interferometry -- 2.1.6 Low-coherence Interferometry -- 2.2 Polymer Cross-linking Characterization -- 2.2.1 Soxhlet-type Extraction -- 2.2.2 Differential Scanning Caliometry -- 2.2.3 Dynamic Mechanical Analysis -- 2.2.4 Spectroscopy-based Methods -- 2.2.5 Low-coherence Interferometry and Other Optical Methods -- 2.2.6 Spatially-resolved Approaches -- 2.3 Film Thickness Measurement -- 2.3.1 Spectral Reflectometry -- 2.3.2 Spectroscopic Ellipsometry -- 2.4 Material dispersion -- 2.4.1 Thermo-optic coefficient -- 2.4.2 Photo-elastic influences -- 2.4.3 Characterization of dispersion -- 3 Surface Profilometry -- 3.1 Experimental Setup -- 3.2 Measurement Range and Resolution -- 3.3 Signal Formation and Analysis -- 3.3.1 Fitting of Oscillating Data -- 3.3.2 Frequency Analysis -- 3.3.3 Two-Stage Fitting -- 3.3.4 Error Estimation of the Data Processing -- 3.4 Two-Dimensional Approach and Characterization -- 3.4.1 Height Standard Evaluation -- 3.4.2 Repeatability and Resolution Characterization -- 3.4.3 Edge Effects -- 3.4.4 Roughness Evaluation -- 3.4.5 High-Dynamic Range

| Sommario/riassunto | This Open Access book discusses an extension to low-coherence interferometry by dispersion-encoding. The approach is theoretically designed and implemented for applications such as surface profilometry, polymeric cross-linking estimation and the determination of thin-film layer thicknesses. During a characterization, it was shown that an axial measurement range of 79.91 µm with an axial resolution of 0.1 nm is achievable. Simultaneously, profiles of up to 1.5 mm in length were obtained in a scan-free manner. This marked a significant improvement in relation to the state-of-the-art in terms of dynamic range. Also, the axial and lateral measurement range were decoupled partially while functional parameters such as surface roughness were estimated. The characterization of the degree of polymeric cross-linking was performed as a function of the refractive index. It was acquired in a spatially-resolved manner with a resolution of 3.36×10^{-5}. This was achieved by the development of a novel mathematical analysis approach. |