

Abstract

The present book chapter delves into the field of nanoscale engineering for fabricating functional interfaces, exploring its implications across diverse fields such as electrochemistry, photoplasmonics, antimicrobial agents, and anticancer applications. It begins with recalling the optical properties of bulk metallic materials, providing a comprehensive foundation for understanding their behavior when scaled down to nanometric dimensions. Therefore, the focus shifts to the description of laser-matter interaction and on the more recent techniques to obtain nano-engineered functional surfaces. Those techniques include both lithography- and nonlithography-based processes employed in synthesizing metal nanoparticles, unveiling the precise control and manipulation achievable. To conclude, a review of the main applications of the nanoengineered surfaces obtained with the described methods is presented and covers different fields, from chemical sensors to antimicrobial and anticancer applications.