



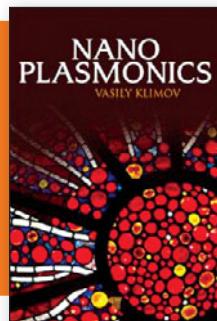
Manufacturing, the authors discuss novel approaches and technologies in the materials and design world. The fundamental technology-driven issues discussed in the materials and design domains are covered, alongside their effects on our daily experiences with materials and products. The design potential of new generations of smart, reactive, and multipurpose materials is discussed.

The fourth section presents the practical task of choosing one material over another. It includes diverse topics such as balancing functionality and expression through materials, ways of learning about material properties, and the development of new experiential-based materials selection tools and methods.

This book is very useful as a fundamental knowledge tool for materials experience

and design. The editors have succeeded in doing this, and they piece each contribution into a good web with extraordinarily diverse competences and perspectives. I recommend this book to those interested in materials design, from those entering the field to professional researchers.

**Reviewer:** *Jianguo Lu is an associate professor at Zhejiang University, China.*



### Nano Plasmonics

Vasily Klimov

Pan Stanford Publishing, 2014

581 pages, \$142.45

ISBN 978-981-4267-16-8

**N**anoplasmonics is a mature subfield of research in nanoscale optics. This book provides a comprehensive description of the plasmon oscillations that occur in metal nanoparticles. The book is written from materials science and physics aspects and comprises 14 chapters and 581 pages. The book is very well translated from Russian by Anna Sharonova.

In chapter 1, the author summarizes key advancements in the field and a number of papers published within the scope of surface plasmons. The contents in subsequent chapters are also outlined. The historical evidence on the existence of plasmonic nanoparticles is briefly discussed in chapter 2. Modern methods of nanoparticle synthesis are also described, including the precipitation from colloid solutions, the reverse micelle process, and the nanolithography approach. Chapter 3 uses electromagnetic equations to describe the propagation of light waves, optical properties of metals, and bulk plasmon properties of metals in the transparent

region. Chapter 4 considers the surface plasmon waves propagating along metal–dielectric interfaces and other complex layered structures. Excitation methods and the observation of surface plasmons are also described.

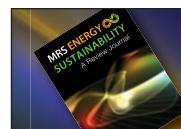
After the introductory chapters, the theory of plasmon oscillation in nanoparticles is described in chapter 5. In chapters 6 to 9, the author introduces the “ $\epsilon$ -method” to describe the optical properties of metal nanoparticles of an arbitrary shape and size. Particular emphasis is placed on the geometries of nanostructures (from spherical to multidimensional ellipsoids and polyhedral nanoparticles), which produce characteristic effects on their resultant plasmonic behaviors.

Chapter 10 in this book describes the plasmon oscillation of nanoparticle clusters consisting of two nanoparticles with various geometries. This is followed by the plasmon wave propagation along a chain of nanoparticles. Chapter 11 evaluates the optical properties of metamaterials, and chapter 12 discusses nanoholes

in metal film as a counterpart of discrete nanoparticles. Finally, chapter 13 is devoted to discuss applications of nanoplasmonics in tumor therapy, biosensing, integrated circuits, superlenses and hyperlenses, and invisible cloaks prior to the conclusion in chapter 14. Two appendices on additional theory and numerical methods are also available.

This book provides comprehensive and systematic materials on nanoplasmonics with sufficient mathematical and conceptual description. Klimov fully describes the shape-dependent effects of nanoparticles. This book may be further improved with additional chapters that emphasize the interactions of nanoparticles with active (or nonlinear) medium or light emitters nearby. Discussion of more recent research work from various research groups would also enhance the value of the book. Overall, this book is very appropriate for graduate students, scientists, and engineers, either beginning to explore the field or already engaged in the research area. The scope of contents, quality of graphics, and clarity of the mathematical descriptions are very satisfactory to the reviewers. Therefore, we can recommend this book to readers who are interested in the field of nanoplasmonics.

**Reviewers:** *Jae Yong Suh and Yoke Khin Yap of Michigan Technological University, USA.*



**Just Launched!**

**MRS ENERGY & SUSTAINABILITY**

[www.mrs.org/energy-sustainability-journal](http://www.mrs.org/energy-sustainability-journal)