

1. Record Nr.	UNINA9910146327303321
Titolo	Nanostructured materials in electrochemistry [[electronic resource] /] / edited by Ali Eftekhari
Pubbl/distr/stampa	Weinheim, : Wiley-VCH [Chichester, : John Wiley, distributor], c2008
ISBN	1-282-78431-5 9786612784316 3-527-62150-4 3-527-62151-2
Descrizione fisica	1 online resource (491 p.)
Altri autori (Persone)	EftekhariAli <1979->
Disciplina	620.5
Soggetti	Nanostructured materials Electrochemistry - Materials Electronic books.
Lingua di pubblicazione	Inglese
Formato	Materiale a stampa
Livello bibliografico	Monografia
Note generali	Description based upon print version of record.
Nota di bibliografia	Includes bibliographical references and index.
Nota di contenuto	Nanostructured Materials in Electrochemistry; Foreword by R. Alkire; Foreword by Y. Gogotsi and P. Simon; Contents; Preface; List of Contributors; 1 Highly Ordered Porous Alumina Formation by Self-Organized Anodizing; 1.1 Introduction; 1.2 Anodizing of Aluminum and Anodic Porous Alumina Structure; 1.2.1 Types of Anodic Oxide Film; 1.2.2 General Structure of Anodic Porous Alumina; 1.2.2.1 Pore Diameter; 1.2.2.2 Interpore Distance; 1.2.2.3 Wall Thickness; 1.2.2.4 Barrier Layer Thickness; 1.2.2.5 Porosity; 1.2.2.6 Pore Density; 1.2.3 Incorporation of Anions; 1.2.4 Cell-Wall Structure 1.2.5 Crystal Structure of Oxide1.2.6 Density and Charge of Oxide Film; 1.2.7 Miscellaneous Properties of Anodic Porous Alumina; 1.3 Kinetics of Self-Organized Anodic Porous Alumina Formation; 1.3.1 Anodizing Regimes and Current/Potential-Time Transient; 1.3.2 Pores Initiation and Porous Alumina Growth; 1.3.2.1 Historical Theories; 1.3.2.2 Field- Assisted Mechanism of Porous Film Growth; 1.3.2.3 Steady-State Growth of Porous Alumina; 1.3.2.4 Growth Models Proposed by Patermarakis and Colleagues; 1.3.2.5 Other Phenomenological Models

of Porous Alumina Growth

1.3.2.6 Other Theoretical Models of Porous Alumina Growth1.3.3

Volume Expansion: The Pilling-Bedworth Ratio (PBR); 1.3.4 Rates of Oxide Formation and Oxide Dissolution; 1.4 Self-Organized and Prepatterned-Guided Growth of Highly Ordered Porous Alumina; 1.4.1 Aluminum Pre-Treatment; 1.4.2 Self-Organized Anodizing of Aluminum; 1.4.2.1 Structural Features of Self-Organized AAO; 1.4.2.2 Order Degree and Defects in Nanopore Arrangement; 1.4.3 Post-Treatment of Anodic Porous Alumina; 1.4.3.1 Removal of the Aluminum Base; 1.4.3.2 Removal of the Barrier Layer

1.4.3.3 Structure and Thinning of the Barrier Layer1.4.3.4 Re-Anodization of Anodic Porous Alumina; 1.5 AAO Template-Assisted Fabrication of Nanostructures; 1.5.1 Metal Nanodots, Nanowires, Nanorods, and Nanotubes; 1.5.2 Metal Oxide Nanodots, Nanowires, and Nanotubes; 1.5.3 Semiconductor Nanodots, Nanowires, Nanopillars, and Nanopore Arrays; 1.5.4 Polymer, Organic and Inorganic Nanowires and Nanotubes; 1.5.5 Carbon Nanotubes; 1.5.6 Photonic Crystals; 1.5.7 Other Nanomaterials (Metallic and Diamond Membranes, Biomaterials); References

2 Nanostructured Materials Synthesized Using Electrochemical Techniques2.1 Introduction; 2.2 Anodic Synthesis; 2.2.1

Electropolishing and Anodization; 2.2.2 Porous Anodic Alumina; 2.2.2.1 Porous Anodic Alumina as Template; 2.2.2.2 Porous Anodic Alumina to Create Nanodevices; 2.3 Cathodic Synthesis; 2.3.1 Nanowires; 2.3.1.1 Template Procedures to Prepare Nanowires; 2.3.1.2 Magnetic Nanowires; 2.3.1.3 Nanotubes; 2.3.2 Multilayers; 2.3.3 Other Materials; 2.3.3.1 Semiconductors; 2.3.3.2 Oxides; 2.3.3.3 Metals; 2.4 Final Remarks; References

3 Top-Down Approaches to the Fabrication of Nanopatterned Electrodes

---

## Sommario/riassunto

Providing the unique and vital link between the worlds of electrochemistry and nanomaterials, this reference and handbook covers advances in electrochemistry through the nanoscale control of electrode structures, as well as advances in nanotechnology through electrochemical synthesis strategies. It demonstrates how electrochemical methods are of great scientific and commercial interest due to their low cost and high efficiency, and includes the synthesis of nanowires, nanoparticles, nanoporous and layered nanomaterials of various compositions, as well as their applications -- ranging from supe

---