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Nota di contenuto	Electrochemical Phase Formation and Growth; Contents; 1 Fundamentals of Electrocrystallization of Metals; 1.1 Thermodynamic and Kinetic Aspects; 1.2 Metal Deposition Mechanisms; 1.3 Topics of this Book; 2 Crystalline Metal Surfaces; 2.1 Structural Aspects; Close-packed 2D and 3D crystal structures; Crystal imperfections and surface inhomogeneities; Surface reconstruction; Surface roughness and the kink position; Step roughness; 2.2 Atomic Dynamics; Atom exchange frequencies; Local, partial, and overall current densities; Kink atoms and the Nernst equilibrium potential Exchange current density of kink atomsConcentration of adatoms; Exchange current density of adatoms; Mean residence time and surface displacement of adatoms; 2.3 Surface Profile Mobility; Surface diffusion and mean displacement of adatoms; Surface diffusion . The exact solution; Direct transfer; Current density on a stepped crystal face; 2.4

Conclusions; 3 Underpotential Deposition of Metals-2D Phases; 3.1 Historical Background; 3.2 Phenomenology; 3.3 Thermodynamics; Thermodynamic formalism; Adsorption isotherm models; Experimental results; 3.4 Structures of 2D Meads Phases
Degree of registryInternal strain; Electrochemical results; Comparative and ex situ UHV results; In situ surface analytical results; 3.5 Kinetics; Quasi-homogeneous substrate surface approach; Inhomogeneous substrate surface approach; Phase transitions; 3.6 2D and 3D Me-S Alloy Formation; Phenomenology; Thermodynamics; Structures of 2D and 3D Me-alloys; Kinetics; 3.7 Conclusion; 4 Initial Stages of Bulk Phase Formation; 4.1 Equilibrium Form of Crystals and Forms of Growth; Equilibrium form; Crystal-substrate interaction; Gibbs-Wulff-Kaishew theorem; Two dimensional crystal; Forms of growth
Energy of cluster formation3D nucleation; 2D nucleation; Gibbs-Thomson equation; 4.2 Nucleation Rate; Classical approach (Volmer and Weber); Kinetic approach (Becker and Doering); Binding energies and energy of nucleation; Atomistic model; Nucleation rate equation; Small cluster model; Experimental results; 4.3 3D Phase Formation on UPD Modified Foreign Substrate Surfaces; UPD-OPD transitions; Nucleation and growth; Epitaxy; Experimental results; 4.4 Conclusions; 5 Growth of Crystalline Faces; 5.1 Dislocation-Free Crystal Faces; Preparation of single crystal faces by electrodeposition
Double pulse techniqueNucleation rate-overvoltage dependence; Time distribution of the nucleation events; Form of growth of monatomic layers; Propagation rate of monatomic steps; Space distribution of nucleation events; Propagation rate of polyatomic steps; Mechanism of metal deposition and adatom concentration; 5.2 Growth Kinetics of Perfect Faces; Mononuclear layer-by-layer growth; Multinuclear monolayer formation; Deposition kinetics on quasi-perfect crystal faces; 5.3 Real Crystal Faces; Dislocations; Spiral growth mechanism; Theory of spiral growth; Growth morphology
Steady state and transient current densities

Sommario/riassunto

Electrochemical processes and methods are basic to many important scientific disciplines, materials science and nanotechnology being only two keywords. For the first time in more than twenty years this volume presents a critical survey of the foundations, methodology and applications of electrochemical phase formation and growth processes. Written by a team of three internationally renowned authors, it is an invaluable source of information for all scientists concerned with electrocrystallization of metals or the in-situ characterization of electron-conducting surfaces. Not only the numerous i