1. Record Nr. UNINA9911020446403321

Titolo	Crystal growth processes based on capillarity : czochralski, floating zone, shaping and crucible techniques / / edited by Thierry Duffar
Pubbl/distr/stampa	Chichester, West Sussex ; ; Hoboken, N.J., : Wiley, 2010
ISBN	9786612684319 9781282684317 1282684310 9781444320237 1444320238 9781444320213 1444320211
Descrizione fisica	1 online resource (567 p.)
Altri autori (Persone)	DuffarThierry
Disciplina	548/.5
Soggetti	Crystal growth Crystallization
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	Crystal Growth Processes Based on Capillarity: Czochralski, Floating Zone,Shaping and Crucible Techniques; Contents; Preface; Introduction; Acknowledgements; Nomenclature; Contributors; 1: Basic Principles of Capillarity in Relation to Crystal Growth; 1.1 Definitions; 1.1.1 Characteristic Energies of Surfaces and Interfaces; 1.1.2 Capillary Pressure; 1.1.3 Surface Energy versus Surface Tension; 1.2 Contact Angles; 1.2.1 Thermodynamics; 1.2.2 Dynamics of Wetting; 1.2.3 Measurements of Contact Angle and Surface Tension by the Sessile Drop Technique 1.2.4 Selected Data for the Contact Angle for Systems of Interest for Crystal Growth1.3 Growth Angles; 1.3.1 Theory; 1.3.2 Measurements of Growth Angles: Methods and Values; 1.3.3 Application of the Growth Angle Condition in Simulations of Crystal Growth; 1.3.4 Summary; Acknowledgements; References; 2: The Possibility of Shape Stability in Capillary Crystal Growth and Practical Realization of Shaped Crystals; 2.1 Crucible-Free Crystal Growth - Capillary Shaping Techniques; 2.2

Dynamic Stability of Crystallization - the Basis of Shaped Crystal Growth by CST; 2.2.1 Lyapunov Equations
2.2.2 Capillary Problem - Common Approach2.2.3 Equation of Crystal Dimension Change Rate; 2.2.4 Equation of Crystallization Front Displacement Rate; 2.2.5 Stability Analysis in a System with Two Degrees of Freedom; 2.3 Stability Analysis and Growth of Shaped Crystals by the Cz Technique; 2.3.1 Capillary Problem; 2.3.2 Temperature Distribution in the Crystal-Melt System; 2.3.3 Stability Analysis and Shaped Crystal Growth; 2.3.4 Dynamic Stability Problem for the Kyropoulos Technique; 2.4 Stability Analysis and Growth of Shaped Crystals by the Verneuil Technique
2.4.1 Principal Schemes of Growth2.4.2 Theoretical Investigation; 2.4.3 Practical Results of the Theoretical Analysis; 2.4.4 Stability Analysis-Based Automation; 2.5 Stability Analysis and Growth of Shaped Crystals by the FZ Technique; 2.6 TPS Techniques: Capillary Shaping and Impurity Distribution; 2.6.1 Capillary Boundary Problem for TPS; 2.6.2 Stability Analysis; 2.6.3 Experimental Tests of the Capillary Shaping Theory Statements; 2.6.4 Impurity Distribution; 2.6.5 Definition of TPS; 2.6.6 Brief History of TPS; 2.7 Shaped Growth of Ge , Sapphire, Si, and Metals: a Brief Presentation
2.7.1 Ge2.7.2 Sapphire; 2.7.3 Si; 2.7.4 Metals and Alloys; 2.8 TPS Peculiarities; References; 3: Czochralski Process Dynamics and Control Design; 3.1 Introduction and Motivation; 3.1.1 Overview of Cz Control Issues; 3.1.2 Diameter Control; 3.1.3 Growth Rate Control; 3.1.4 Reconstruction of Quantities not Directly Measured; 3.1.5 Specific Problems for Control in Cz Crystal Growth; 3.1.6 PID Control vs. Model-Based Control; 3.1.7 Components of a Control System; 3.1.8 Modelling in Crystal Growth Analysis and Control; 3.2 Cz Control Approaches; 3.2.1 Proper Choice of Manipulated Variables
3.2.2 Feedforward Control

Sommario/riassunto

The demand for large, high-quality single crystals has increased rapidly as a result of the growing semiconductor and optics industry, where perfect single crystals are used as substrates or components for devices. Crystal Growth Processes Based on Capillarity covers all crystal growth techniques and explains why and how they are dependent on liquid surface phenomena, or capillarity. Each chapter addresses fundamental capillary effects, detailed experimental developments, technically important processes, and associated software. The book includes: Basic prin