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| 1. Record Nr. | UNINA990009248260403321 |
| Titolo | Automated Reasoning [Risorsa elettronica] : Third International Joint Conference, IJCAR 2006, Seattle, WA, USA, August 17-20, 2006. Proceedings / edited by Ulrich Furbach, Natarajan Shankar |
| Pubbl/distr/stampa | Berlin ; Heidelberg : Springer, 2006 |
| ISBN | 9783540371885 |
| Collana | Lecture notes in computer science , Lecture notes in artificial intelligence , 0302-9743 ; 4130 |
| Lingua di pubblicazione | Inglese |
| Formato | Risorsa elettronica |
| Livello bibliografico | Monografia |
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- | | |
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| 2. Record Nr. | UNINA9910453125503321 |
| Titolo | Advanced ceramics for dentistry / / [editors], James Zhijian Shen and Tomaz Kosmac |
| Pubbl/distr/stampa | Waltham, MA : , : Butterworth-Heinemann, , [2014]
©2014 |
| ISBN | 0-12-394836-3 |
| Descrizione fisica | 1 online resource (417 p.) |
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KosmacTomaz |
| Disciplina | 617.695 |
| Soggetti | Dental ceramics
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 | Front Cover; Advanced Ceramics for Dentistry; Copyright Page; Contents; List of Contributors; Preface; 1 Introduction; 2 Teeth; 2.1 Introduction; 2.2 Microstructure of Teeth; 2.2.1 Enamel; 2.2.2 Dentin; |

2.2.3 Cementum; 2.2.4 Pulp; 2.3 Optical Properties of Teeth; 2.3.1 Color; 2.3.2 Opacity and Translucency; 2.3.3 Fluorescence; 2.3.4 Opalescence; 2.3.5 Metamerism; 2.4 Mechanical Properties of Teeth; 2.5 Common Defects and Damage; Acknowledgments; References; 3 Dental Prostheses; 3.1 Introduction of Prosthodontics and Dental Prostheses; 3.2 Restoration of Tooth Defects; 3.2.1 Direct Fillings 3.2.2 Inlays and Onlays 3.2.3 Laminate Veneers; 3.2.4 Partial Crowns; 3.2.5 Full Crowns; 3.2.6 Post-and-core; 3.3 Restoration of Partial Edentulism; 3.3.1 Fixed Partial Dentures; 3.3.2 Bonded Bridges; 3.3.3 Removable Partial Dentures; 3.3.4 Precise Attachment Dentures; 3.4 Restoration of Complete Edentulism; 3.4.1 Complete Dentures; 3.4.2 Overdentures; Acknowledgments; References; 4 Dental Implants; 4.1 Principle Structure of Dental Implants; 4.1.1 Classification of Implantation and Loading Mode; 4.1.2 Classification by Time of Implantation After Tooth Loss; 4.1.3 Indications 4.1.4 Indication Limitation 4.1.5 Contraindications; 4.1.6 Advantages of Implants; 4.1.7 Disadvantages of Implants; 4.1.8 Implant Materials: Titanium vs. Zirconia; 4.1.9 History of Ceramic Implants; 4.1.10 Properties of Ceramics; 4.1.11 Advantages of Ceramic Implants; 4.1.12 Disadvantages of Ceramic Implants; 4.2 Implants; 4.2.1 Implant Types; 4.2.2 Implant Forms; 4.2.3 One-piece and Multi-part Systems; 4.2.4 Survival Rates; 4.3 Abutments; 4.3.1 Abutment Design: Individually Produced vs. Prefabricated; 4.3.2 Survival Rates of Ceramic Abutments; 4.4 Suprastructure; 4.5 Clinical Procedures 4.5.1 Surgical Procedure 4.5.1.1 Pre-Surgical Planning; 4.5.1.2 Intra-operative Behavior; 4.5.1.3 Post-surgical Behavior and Education; 4.5.2 Complications; 4.5.2.1 Intra-operative Complications; 4.5.2.2 Post-operative Complications; 4.6 Fitting and Bite Force; 4.6.1 Fitting of Ceramic Implants; 4.6.2 Bite Force and Fracture Risk of Implants; 4.7 Infection Management; 4.8 Osseointegration; References; 5 Clinical Failures of Ceramic Dental Prostheses; 5.1 Fractographic Analysis of Ceramics and Glasses; 5.1.1 Tools and Equipment; 5.1.2 Fracture Patterns and Origins 5.1.3 Fracture Surface Examination 5.2 Failures of Ceramic Dental Prostheses; 5.2.1 Fracture Features; 5.2.1.1 Cracking Initiated at the Margin; 5.2.1.2 Cracking Initiated at Occlusal Contacts; 5.2.1.3 Porcelain Chipping and Delamination; 5.2.2 Analysis of Failure Origin; 5.2.2.1 Failure Origins as Defects or Flaws; 5.2.2.2 Hertzian Cone Cracks Under Compressive Stress; 5.2.2.3 Cracks at Interface Under Tensile Stress; 5.2.3 Flaws and Defects; 5.2.3.1 Flaws/Defects and Failure Origins; 5.2.3.2 Defects in Porcelain; Gas Bubbles; Inclusions; Agglomerates; Compositional Inhomogeneities 5.2.3.3 Defects in Ceramics

Sommario/riassunto

The growth of implant and fixed prosthodontics practices in dentistry has created a rapidly increasing demand for advanced ceramics and ceramic processes. Innovations in ceramics and ceramic processes are vital to ensure reliable and affordable dental-restoration solutions with aesthetically pleasing outcomes. The work aims to engage the bioceramics and engineering communities to meet the challenges of modern dental restoration using advanced ceramics. Incorporating fundamental science, advanced engineering concepts, and clinical outcomes, the work is suitable for bioceramicists, cer
