



Academy of Prosthodontics Annual Scientific Session Naples, Florida | May 3 – 6, 2023

Program Speaker – Yu Zhang

Title

A Critical Analysis of Ceramic Restorative Materials for the Digital Workflow

Abstract

The purpose of this presentation is to critically examine current understanding of dental ceramics for the digital workflow and to identify future research needs for these materials in relation to novel compositions and fabrication methods. With rapid advances in material development and digital technology, time efficiency of dental workflow and fit accuracy of ceramic restorations are ever improving. Zirconia and lithia-based glass–ceramics are at the forefront of this advance. The trend in fabrication is to move from CAD/CAM grinding of partially sintered/crystallized blocks to fully sintered/crystallized materials, thereby circumventing the need for post-machining heat treatment altogether. In these endeavors, a better understanding of mechanical properties and evolving shaping technologies such as ductile grinding is paramount. Additive manufacturing methodologies offer a promising alternative to current CAD/CAM subtractive manufacturing routes. Challenges to the implementation of new technologies in efficient development and production of high quality dental ceramic prostheses will be addressed.

Learning Objectives

1. A facile understanding of the composition, microstructure, and properties of various classes of ceramic restorative materials for the digital workflow
2. The emerging grind-and-seat ceramic restorative systems without the need of any post-shaping heat treatment.
3. Novel fabrication methodologies such as ‘ductile’ grinding and 3D printing technologies offer the prospect of more efficient and longer lifetime ceramic restorations.

Biography

Dr. Zhang received his M.S. degree in Physics and Ph.D. degree in Materials Science from La Trobe University and Monash University in Australia. He worked as a Postdoc at the Ceramic Division, NIST, Gaithersburg, MD. In February 2005, Dr. Zhang joined the NYU College of Dentistry as an

Assistant Professor, where he was promoted to Full Professor in 2018. He then joined the University of Pennsylvania School of Dental Medicine in 2020. His research interests include the development of functionally graded and nanostructured ceramics for superior translucency, damage resistance, and bioactivities. Dr. Zhang received five NIH R01 grants, and a NSF research grant. He is a recipient of the Arthur R. Frechette Award from the Prosthodontic society of IADR. He is a Fellow of the AADR, Fellow of the Academy of Dental Materials, and the past President for the IADR Dental Materials group. Dr. Zhang has published some 150 journal articles and book chapters and holds 3 US patents.