



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

Program Speaker – Jeffrey Stansbury

Title

The Dental Application of Novel High-Performance 3D Printed Polymers

Abstract

In 2007, a number of investigators reported poor prosthetic stability of both the provisional and definitive complete arch fixed implant prostheses. Both veneer fracture and tooth wear were common mechanical complications. A low-cost highly durable substitute for methyl methacrylate with a digital workflow was needed. The evolution of a commercially available polymer using additive manufacturing will be discussed from ideation to research to clinical trials. Other dental applications will also be reviewed. From the materials perspective, the challenge was to develop photopolymers that offer substantially increased strength with simultaneously enhanced toughness, which are typically contradictory property targets. Formulations in which crosslinked polymers are reinforced via strong noncovalent coordinating interactions are successfully addressing these needs. Ongoing studies have identified related new 3D printable materials that further extend the bounds of polymeric material performance with excellent potential to contribute to the continued evolution of digital dentistry.

Learning Objectives

1. Identify unmet needs in dentistry for material science advancement
2. Summarize the research that has led to high performance polymers using additive manufacturing
3. Discuss present and future applications of new polymers

Biography

Dr. Stansbury is professor in the Department of Craniofacial Biology at the University of Colorado School of Dental Medicine, Anschutz Medical Campus where is also the Senior Associate Dean for Research. His PhD is in organic/polymer chemistry and he also holds an appointment in the Department of Chemical and Biological Engineering at the CU Boulder Campus. He is a past-president of the Dental Materials Group of the International Association for Dental Research (IADR) as well as the Academy of Dental Materials. He received the Souder Award as an IADR Distinguished Scientist. Dr. Stansbury has more than 180 peer-review publications that span from fundamental polymer science to applied dental materials and includes a 2016 paper on 3D printing with over 1400 citations. His research has produced more than 30 patents and he has previously been recognized as Inventor of the Year at the University of Colorado.