

# DENTISTRY AND DENTAL MATERIALS

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## DENTAL ZIRCONIA: AN OVERVIEW ON BASIC BIOLOGICAL, PHYSICO-MECHANICAL PROPERTIES AND CLINICAL APPLICATIONS

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Zirconia is a ceramic crystalline biomaterial of zirconium dioxide "ZrO<sub>2</sub>" that provides adequate biological and physico-mechanical properties for manufacturing of multiple medical and dental devices. Zirconia had reported not only a wonderful biocompatibility in multiple *in vivo* studies, but also an amazing bioactivity "Biointegration" following its insertion into living bones or muscles. Stresses on a Zirconia surface produce a crystalline transformation "Transformation Toughness of Zirconia" associated with volumetric changes which hinders the propagation of cracks. The anelastic strain of smart yttria-stabilized zirconia "3Y-TZP" is supposed to modulate any stress concentration in order to avoid catastrophic failure in that brittle material. Nowadays, zirconia cores are esthetically used upon mutilated anterior and posterior teeth for construction of fixed partial dentures "FPDs" as well as on implant fixtures. However inherent zirconia opacity is very useful in certain clinical situations like masking color of discolored abutment teeth, there is scarcity of the aesthetic translucency. Development of technology offers solution to achieve translucent zirconia "Lava zirconia". In addition, zirconia radiopacity is actually helpful in radiographic evaluations. Computer aided design/computer aided manufacturing "CAD/CAM" technology is implemented to obtain zirconia based restorations. Cementation of zirconia restorations to tooth structure is performed with recent resin adhesive systems. Fracture toughness of zirconia based FPDs are superior to that of other non-metallic restorations. Zirconia implant is characterized by performing successful biointegration into bone and realizing an excellent aesthetic outcome for implant supported prosthetic rehabilitations. Newly introduced zirconia implants are manifested by superb biological, magnificent esthetic and amazing mechanical properties; which recommend further researches.

## BIOGRAPHY

Hoda Gaafar Hammad is an Assistant Professor and Head of Division of Dental Biomaterials, as well as Assistant Professor of Operative Dentistry; BMC (Batterjee Medical College), Dental Program, Jeddah, Saudi Arabia (KSA) since 15 October 2018 to till date. She Completed her PhD in Restorative Dentistry: Dental Biomaterials, Faculty of Dentistry, Cairo University as collaboration with University of Rennes 1, France: "Fabrication of a bioactive composite scaffold for drug delivery" from 2011 to 2014. She completed Master Degree of "Clinical Restorative Dentistry" including; Operative Dentistry, Endodontics, Fixed Prosthodontics (Laminates, inlays crowns and bridges) and Dental Biomaterials, Faculty of Dentistry, Cairo university: "Effect of acid etching on shear bond strength of resin modified glass ionomer and polyacid modified resin composite to human enamel and dentin" from 1998 to 2001. She completed her Bachelor of Oral Medicine and Dental Surgery and Faculty of Dentistry, Cairo University, Egypt during 1990 to 1994.

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