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NANO-ZIRCONIA DENTAL CERAMIC – A SOPHISTICATED AND ECONOMICAL APPROACH

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ABSTRACT

Among the dental ceramics nano zirconia has emerged as a versatile and promising material. Unlike conventional dental ceramic powder made by grinding dental ceramic, nano crystals are formed by vaporisation into individual particles. Tetragonal zirconia particles thus formed are not broken into pieces and so do not transform to weaker monoclinic zirconia and weaker sinter products. The particles created by this approach can be much smaller and dental prostheses sintered from this powder can be stronger and more realistic. For instance, the smaller size of sintered tetragonal zirconia crystals increases optical translucence by reducing scattering from birefringence and the small average particle size and tight distribution of sizes and shapes can essentially eliminate pores in a sintered product. Cylindrical and spherical particles can be manufactured by this approach, whereas prior art dental ceramic particles (presented elsewhere) were generally neither. In addition to tetragonal zirconia various dental ceramic particles and powders can be made by this approach which can be used to form various sintered dental prostheses. By choosing appropriate preparation method, weakly agglomerated powders with fine particle size can be obtained. The zirconia part of nano composite powder was transmitted to partially stabled zirconia after the use of stabiliser. Aluminia-zirconia nano-composite infiltrated ceramic is a new infiltrated ceramic with favourable mechanical properties. It demonstrated a promising future for clinical application. Mechanical properties (flexural strength tested with three point bending and the fracture toughness with Single Edge Notch Bend (SENB) method/s and microstructure by X-Ray diffraction (XRD) and Scanning Electron Microscopy (SEM) of Alumina-zirconia of nano-composite infiltrated ceramic besides thermal treatments, hot and cold, based on requirement to alter the properties (macro alloy Ph.D thesis).

Keywords: Nano-Zirconia, Dental Ceramic, Tetragonal, Micro Structure, Thermal Treatment.